Municipal Journal

Volume XXXII. NEW YORK, MARCH 21, 1912. No. 12

LAYING CONCRETE PAVEMENT AT LIBERTY, MO.

At 3 P. M., mercury at 32°. It fell to 7° the next morning.

CONCRETE PAVING IN EIGHT CITIES

In Kansas City and Liberty, Mo.; Marshalltown and Sioux City, Ia.; Bozeman, Mont.; Bemidji, Minn.; Appleton, Wis., and Greenville, Ill.—One-Course and Two-Course Construction—Expansion Joints

IN KANSAS CITY, MISSOURI.

By CLARK R. MANDIGO, Assistant City Engineer, Kansas City, Mo.

FROM April 17, 1911, the beginning of the present fiscal year, to March 10, 1912, Kansas City laid 46,029 square yards of plain concrete pavement on streets at a cost of $56,559.78, a little less than $1.23 per square yard. During the same period 28,052 square yards of this pavement were laid on alleys at a cost of $38,645.57, or approximately $1.38 per square yard. On streets the total amounted to 3.3 miles, on alleys 3.4 miles. In addition to the above quantities contracts have been awarded during the past winter for concrete pavement on streets to the amount of $79,067.82, at an average price of $1.04 per square yard, but the work has not been completed. With this work in view I believe the coming year will nearly double the amount of concrete pavement laid in 1911. In 1910 scarcely any of this class of pavement was constructed on streets.

The lowest price paid for concrete pavement during 1911 was $1.02 per square yard; the highest price $1.47. Recent contracts have been let for as low as 96c. per square yard. The price of cement has varied in 1911 from $1.30 to 88c. per barrel; sand averages $1 per cubic yard delivered, and crushed rock, $1.35. All contracts include the cost of sub-grading and provide for payment in special tax bills issued against the abutting property, which the contractor must dispose of at a discount ranging from 7 per cent. to 10 per cent., or carry himself. These tax bills are not issued until after all work has been completed and accepted. All concrete pavement carries a maintenance bond and guarantee for a period of five years.

The first concrete pavement in Kansas City was laid in 1904, on the alley between Forest and Tracy from Fourteenth to Fifteenth streets, a closely built semi-residence and business section, and is in good condition to-day. Up to 1910, however, only 1.63 miles had been constructed, all on alleys. It was not until the fall of 1910 that any concrete pavement was laid on streets, and this was put down as a temporary expedient on one of the heaviest traffic streets in Kansas City—Sixth street from Broadway to Bluff street, which is about 1,200 feet in length and con-

nects a large wholesale district with the freight and warehouse district. It had been paved with asphalt, but the traffic had increased to such an extent that it was almost impossible to keep the asphalt in repair after the ten-year maintenance period expired in 1909. Condemnation proceedings had also been instituted to widen the street. On the advice of L. R. Ash, city engineer, a "temporary" pavement of plain concrete was laid in November, 1910, because it was the cheapest form of pavement and because it could be used for the foundation of a stone block pavement the following season when the street was widened. The condemnation proceedings have been appealed and delayed so that this concrete pavement is still in use at the present time.

The concrete was 6 to 8 inches thick in one course, of a mixture of 1:2½:4½. It was begun with the expectation that very cold weather might set in any day and was laid consequently in a hurried manner and without expansion joints. The entire surface was covered with manure and left two weeks to harden. During this time the temperature dropped several degrees below freezing every night and the pavement was thrown open to traffic with snow on the ground. At the end of the first month the pavement was in use, the temperature dropped about 50 deg. in a few hours, with a minimum of 10 deg. below zero in the next three days. The temperature rose almost as rapidly as it dropped. When the temperature was at the lowest, transverse cracks appeared at intervals of about 125 feet, but opened only about ⅛ inch. The cracks have given no further trouble. The sudden changes of temperature seemed to soften the surface of the pavement, but no general defects appeared below a surface depth of ¼ inch. Since the pavement has been in use, however, a number of chug-holes have developed. This is due, no doubt, to the poor quality of stone used, a soft limestone, and to the fact that in the hurry of placing the concrete rock pockets occurred. A considerable portion of the surface is in good condition to-day, after 15 months of the hardest kind of use. The surface has an appearance similar to a terazzo floor, with the rock showing flush with the surface. A census of traffic taken for three days last summer showed an average of 786 motor vehicles and 4,558 horse-drawn vehicles per 24 hours over this street. The horse-drawn vehicles were almost entirely heavy drays. The roadway is 36 feet wide.

I have gone into the circumstances of the construction on this particular street somewhat fully, because it really marks the beginning of the use of one-course, plain concrete pavement in Kansas City. Under adverse circumstances of construction and the most severe treatment from traffic, this particular pavement proved so serviceable that Mr. Ash drew specifications for and recommended its use on residence streets in this city. The soil of Kansas City is a heavy clay which requires the laying of a pavement as soon after grading as possible in order to make the street serviceable. Heretofore most of the residence streets have received asphalt paving, which has proved very good, but high-priced for outlying, newly developed residence districts, the average price being close to $1.90 per square yard. The figures given at the beginning of this article indicate how well the concrete pavement has been received and what a saving to the property owners its use has meant. On through streets which are liable to carry considerable miscellaneous traffic, the pavement is made 8 inches thick, on residence streets 6 inches thick.

The following quotations from the standard specifications describe the methods used in the construction of concrete pavement both on streets and in alleys, except that no expansion joints are required on alleys. The sub-grading, as stated before, is done by the paving contractor.

The sub-grade shall be thoroughly rolled with a steam roller weighing not less than 250 pounds per inch of face. Should such rolling develop any soft or spongy ground the same shall be removed and such excavations and such depressions as may appear shall be refilled with earth or broken rock acceptable to the city engineer and the entire sub-grade be brought to an even and compact surface by rolling or ramming. In all cases the sub-grade shall be acceptable to the city engineer before starting the construction of the pavement and any damage from hauling over it must be repaired before concrete is deposited on it.

In case springs or other conditions are encountered that in the opinion of the city engineer require drainage, the same shall be installed and connected with sewer or other drainage indicated by the city engineer.

All excavated material shall be at the disposal of the contractor.

The broken stone shall be clean, hard limestone, crusher run, but screened from dust and dirt with largest stone of such size as will pass a 1½-inch ring. The stone must be free from dirt or any deleterious matter and must contain no soft, flat or elongated particles.

The Portland cement concrete shall be composed of 1 volume cement, 2½ parts sand and 4½ parts of broken stone. All measurements to be of loose materials.

Concrete must be mixed by a machine of a type that will insure accurate proportions of the ingredients, and be acceptable to the city engineer.

The materials shall be mixed wet enough to produce a concrete of such consistency that it will flush readily when tamped, but which can be handled without causing a separation of the coarse aggregate from the mortar, and which will not creep toward the curb or sag out of place when deposited and lightly tamped. After the addition of water the mixture shall be handled rapidly to the place of final deposit. Under no circumstances shall concrete be used that has partially hardened.

The concrete must be taken from the machine in such manner as will insure against loss of mortar, and deposited to such depth that when tamped and properly finished the pavement shall have a thickness of 6 inches (on residence streets) and the upper surface shall be true and uniform.

The concrete must be deposited in strips transverse to the roadway, and when interruptions occur of such length as to permit the setting of concrete, the pavement must be finished against a board set vertically and at right angles to the street, so that the depositing of concrete may be resumed without disturbing that already in place.

The pavement shall be finished by thorough hand tamping until the mortar flushes freely to the surface, then lightly tamped with a templet of 2-inch plank, shaped to conform to the curvature of the surface of the finished pavement, and having a length of not less than one-half the width of the roadway, to give a uniform surface, with the slight markings from the templet transverse to the street.

Expansion joints not greater than ½ inch shall be placed transversely to the street and at intervals not exceeding 50 feet. An expansion joint may be put at a place where the laying of the pavement is interrupted, provided it is not closer than 25 feet to another joint.

Care must be taken not to chip the edges of the concrete in removing templets used to make expansion joints.

After the concrete has sufficiently hardened the spaces left for expansion shall be cleaned and then filled with an asphaltic cement or paving pitch to be approved by the city engineer.

During the first four days after placing the concrete shall be kept moist.

At all times during the construction of the pavement nothing must be allowed upon it that will disturb the concrete while setting and the street shall not be thrown open to traffic until the engineer so directs.

The excess of mortar in the 1:2½:4½ mixture is necessary to make the concrete work easily in laying and prevent any tendency to form rock pockets. The practice of finishing the pavement with the 2-inch plank templets described in the above specifications has been found unsatisfactory and has been discontinued. At present the surface is obtained by gauging the concrete with shovels to stakes driven at the quarter points and in the center, tamping the concrete with a heavy, wide-base tamp and finally brooming the entire surface with an ordinary street push-broom. This gives a slightly roughened mortar finish to the surface. Care should be taken to get the concrete on each side of the expansion joint at the same level to avoid a bump. The length of time the street is closed to traffic after the concrete has been placed depends on local conditions and the weather, but should be at least two weeks, while every additional day adds materially to the life of

the pavement. In other words, to have a good pavement, the concrete must be first class in every particular and anything which makes for proper concrete improves the pavement.

In two cases where the city has paid for the paving in cash, and on several private jobs, the curb and pavement have been constructed combined. The reason this has not been done on city contract paving is on account of certain legal difficulties in issuing a combined tax bill. In construction of this character forms for the back of the curb are set and the pavement laid up to these forms. As soon thereafter as the concrete will permit and before it becomes dry, the front forms for the curbs are placed on it and held in position by clamps and spacers to the rear form. The curb is then constructed. It is necessary to follow with the curb before the pavement is hard set to insure a bond. Of course, a good bond is absolutely essential in this class of work.

Concrete pavement has disadvantages like every other kind of pavement. It is more noisy than macadam, more dusty than asphalt, the surface may bleach out white in the sun and be hard on the eyes; there is liable to be difficulty with the expansion joints, and under heavy traffic the abrasive wear is appreciable. Where its use is restricted to residence streets, highways and other light traffic streets I believe the one-course plain concrete is absolutely the most economical pavement to use. It can be laid two or three inches below the established grade and used later as a foundation for a sheet asphalt, bitulithic, brick, or any other kind of pavement. It is cheap and durable; affords good footing for horses; is not slippery in wet weather; can be used on steep grades with a slightly roughened surface; is a clean pavement, and can be easily laid and repaired by unskilled labor without plant installation. This last advantage alone should recommend it strongly to small cities. Kansas City's experience has been very satisfactory.

CONCRETE PAVING IN MARSHALLTOWN

By W. H. STEINER, City Engineer

CONCRETE paving in Marshalltown, Ia., does not differ materially from that laid in other cities, except as to the expansion joints. The base consists of five inches of concrete composed of one part cement, three parts sand and five parts gravel. The aggregate is pumped from the river and run over a ¼-inch screen to separate the sand and stone. As soon as the base has been laid it is covered with a 2-inch wearing surface composed of one part cement to two parts sand. This surface is not scored in any way, but is slightly roughened with a broom.

Expansion joints are placed next to the curb (we do not have the combined curb and gutter) in the center of the pavement parallel to the curb, and across the street at 15-foot intervals. Most of the paving is 30 feet feet wide, and we thus obtain blocks 15 feet square. The expansion joints next to the curbs are ¾ inch in width, filled with an asphaltic filler; that down the center of the street is ¼ inch in width, as are the transverse joints, and both are filled with rubberoid or any good tar paper.

The contractor lays one side of the street for a block, or more if he deems necessary, placing the paper at the transverse expansion joints as he goes. This paper is cut a little more than 7 inches in width in order to have it project above the pavement. After the pavement is hard enough to be walked on, a man cuts off the extra paper with a sharp shovel, leaving it level with the pavement. The top of the paper placed in the expansion joint down the center of the pavement is placed even with the top of the pavement and is held in position by a few small tacks driven into the pavement already laid. After this side has been completed the contractor proceeds with the other side of the street.

So far as I know this method of laying is not used in any other city. Whether it is more successful than other methods remains to be seen, but it was used in laying some pavement in 1910, and as yet only two very small cracks have appeared, and these show no signs of wear. The same method was employed in pavement laid last fall, and we expect to put down some more of it this year.

Many engineers object to having an expansion joint along the center of the street, but most of the concrete paving which I have seen that did not have this joint had cracked more or less in a zigzag line down the center of the pavement, which cracks, however, show little wear, as the traffic is more on either side of the street than in the center. These longitudinal cracks which appear of their own accord are more or less unsightly and vary greatly in width, and when seen by the public cause them to condemn the pavement. Moreover, by placing a joint in the center it has a tendency to check any transverse cracks when they reach the center of the pavement. Also, if the pavement is found defective in any way a 15-foot block can be taken out without in any way affecting the rest of the pavement.

I believe more cracks will appear in pavements laid during the hot months than in those laid in the spring or fall, but I believe the most important secret of success of concrete paving is in the expansion or contraction joints.

LAYING IN FREEZING WEATHER

By E. H. COLLINS, City Engineer, Liberty, Mo.

CONTRACTS were let by the city of Liberty, Mo., in July, 1911, for about 17,000 square yards of concrete paving, extending along about one mile of street and including two miles of curbing. The contract price for the paving, including grading and all other work and material, was $1.18 per square yard. The concrete curb cost 38 cents per lineal foot. The contractor, J. T. Carr, of Liberty, used a machine mixer for both base and wearing surface concrete. All curbing was set before any grading was done, and for this reason and because of the very wet weather, it was October before work was actually started on the paving itself. The contract called for the pavement to be finished on or before November 15, but freezing weather set in unusually early, and on the first of November there still remained to be placed about 1,200 feet of street, or 4,000 square yards of pavement. It seemed very desirable to clean up the street, and consequently concrete was placed whenever opportunity offered and it was not too cold, one-half pound of salt to the barrel of cement being placed in the wearing surface mortar, and the day's work being covered each evening with bedding straw and litter from livery barns. The sub-grade was also kept covered with the same kind of material to keep it from freezing, this material being removed immediately ahead of the concrete and the ground swept clean. The delay caused by these precautions was such that, while 180 to 200 lineal feet of street per day had been laid prior to November 1, this 1,200 feet was not finished until December 20.

In order to test the effect of freezing on this construction, the writer had some forms made 8 by 12 by 6 inches deep, which were filled with concrete, and these blocks left on the street until it was opened for traffic, and although the mercury went down nearly to zero during some of the nights following the placing of the concrete, these samples showed up as strong as samples taken in October, the salt and manure apparently having saved the concrete, and at this date the pavement gives no evidence of weak spots and not a crack can be found, although we have just passed through the most severe winter we have had in 20 years. In the future, however, we do not propose to take any long chances, but will make an effort to have all street work finished by the last of October.

The pavement was constructed as follows: The sub-grade was thoroughly rolled with a heavy roller to a com-

pact surface and a 5-inch concrete base placed thereon, composed of one part Portland cement, 2½ parts sand and 5 parts broken stone, or one part cement, 2 parts sand and 5 parts coarse Joplin grit, "with sufficient water to make a concrete of such consistency that when rammed the mass will not shake, but will, when struck, compact within the area of the face of the hammer without displacing the material laterally." This concrete was rammed until free moisture appeared on the surface, and a wearing surface was immediately placed consisting of one inch of mortar composed of one part cement and two parts sand. This wearing surface was steel-troweled and finished with a wood float, and before it had hardened was brushed with a stiff brush or broom where the engineer directed. The pavement was left in a finished condition every evening, even if the finishers had to work overtime.

Two classes of joints, known as contraction and expansion joints, were employed. Expansion joints ¾-inch wide were made next to each curb; also an expansion joint ½-inch wide was made every 50 feet across the pavement. These were all filled with bituminous cement. Contraction joints are transverse joints placed midway between the transverse expansion joints and are approximately ⅛-inch in width. The edges of all expansion and contraction joints were rounded to a radius of about ½-inch, and extreme care was exercised in removing templates to prevent disturbing any of the concrete after it had taken its initial set.

After the wearing surface had taken its initial set, sand, straw or hay was spread over the pavement and kept moist for several days, after which it was allowed to lie without wetting for a week or more. No traffic was allowed on any pavement within 21 days of the time it was laid, as the writer believes that one of the causes of the failure of concrete pavement—when it does fail—is that it was opened to the public before the concrete was properly seasoned.

We probably have not the ideal contraction or expansion joint, but I believe we are approaching it. It seems quite reasonable to think that if your strongest construction is at the point you place your weak planes, you are eliminating the raveling process, and by properly placing the weak planes you eliminate to a great extent the cracking from contraction. If I had a street over 36 feet wide I would make the wearing surface 2 inches thick up to 45 feet wide, and for greater width I would thicken the base as well as retaining the 2-inch top. I wish to give credit to F. P. Wilson, city engineer of Mason City, Ia., for several of the ideas embodied in this construction.

BOZEMAN'S CONCRETE PAVEMENTS

By CARL C. WIDENER, City Engineer.

The first concrete pavement in Bozeman, Montana, was laid in 1908. Bids were opened July 2 of that year and a prominent construction company of Salt Lake City, Utah, was found to be the lowest bidder and the contract was awarded at the following prices: For excavation, 50c. per cubic yard; for gravel fill, $1.25 per cubic yard; for concrete pavement (not including excavation or gravel fill), $1.95 per square yard.

The principal points in the construction of the pavement were these: The street was excavated and rolled with a 10-ton roller, 3 inches of fine gravel was then placed on the rolled surface. The forms were then set. These consisted of 2x7 inch plank set with the top at grade and running across the street from curb to curb where there was no street railway track. Along the street railway track one side was constructed at a time. These forms were set 10 feet apart and steel headers set 10 feet apart between the forms, making blocks 10 feet square. The foundation was then guaged to 7 inches below grade and 5½ inches of concrete placed in every alternate space and well tamped. This concrete consisted of 1 part Portland cement and 6 parts of natural gravel where the sand was found to be in the right proportion. The gravel was limited to 2 inches in diameter.

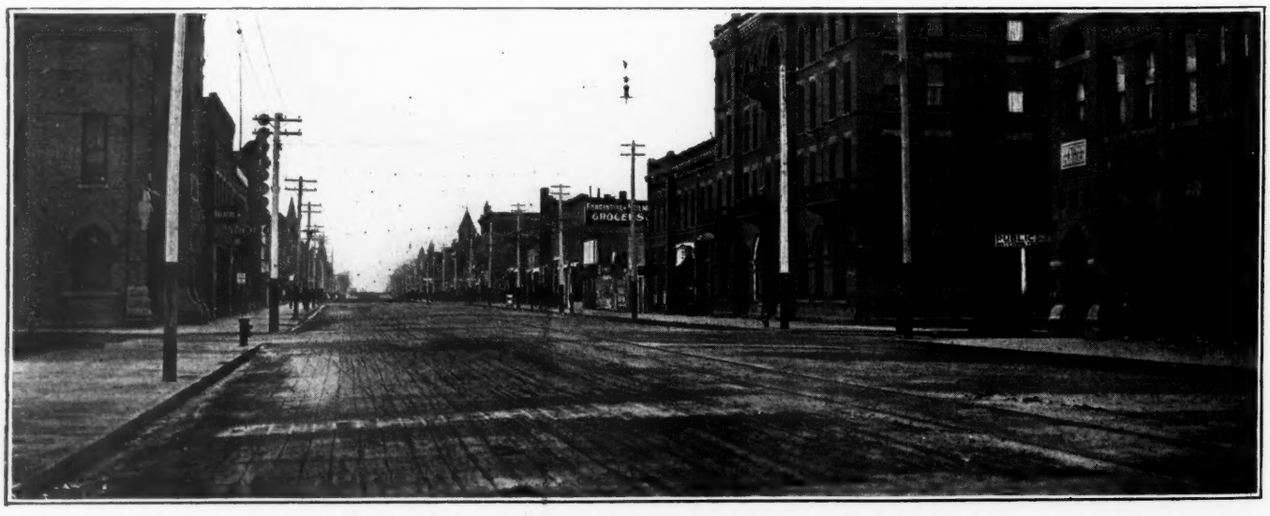
Before the concrete had set the top coat, 1½ inches thick, was placed thereon and troweled into the concrete. This top coat consisted of 1 part cement, 1 part crushed boulders or pea gravel and 1 part sand, the crushed stone or pea gravel being limited to ½ inch in diameter and the sand very coarse.

The wearing surface was marked off into squares about 4x10 inches, with grooves about ¾ inch deep, made by using a plank shod with iron. The surface was then brushed and left quite rough. The grooves, 4 inches apart, run across the street at right angles to the curb and the grooves 10 inches apart are parallel with the curb. Expansion joints were run across the street every 100 feet and also along the curb.

The length of the street paved was 3,495 feet, amounting to 25,781 square yards. The total cost of the pavement, including all items, was $2.28 per square yard; cement costing about $2.40 per barrel, sand and gravel costing $2 and $1.25, respectively, labor at $2.50 per day of eight hours and using machine mixers. (From report of C. M. Thorpe, Bozeman.)

As it has now been a little over three years since this pavement was laid, one can gather a pretty fair idea where the methods of construction might be improved upon.

At the places where the steel headers were used, running parallel with the street, considerable wear has been in evidence. Last season the contractors, under their 5-year guarantee, chipped these grooves out of practically the whole length of the street and filled them with a rich mixture of sand and cement. This seems to be holding up pretty well, but has hardly been in long enough for a fair test as yet. Also where the forms were used, running across the street, considerable wear is in evidence, but hardly enough to warrant any repairs at the present time,



CONCRETE PAVEMENT IN BOZEMAN, MONT., LAID IN 1908

and not nearly so bad as the grooves running parallel with the street. This is accounted for by the fact that the heavy traffic in passing along the street would get the edge of one wheel in a longitudinal groove and cause a continual grind on the edge of the groove, and it was not a great while until the groove was, in places, wide enough to admit of the width of a wagon wheel.

The grooves in the wearing surface have also shown some signs of wear, but not any more than could be expected.

In some places the pavement seems to have sunk an inch or more and this but calls to mind the extreme necessity of having a firm foundation for all concrete work, and if necessary a system of underdrainage.

In 1910 another block of concrete pavement was laid adjoining the first pavement. This block consisted of 2,915.3 square yards, and was constructed by the same company as the above at the following contract prices: Excavation, 50c. per cubic yard; gravel fill, $1.50 per cubic yard; concrete pavement, $2.05 per square yard.

The thickness and mixture of both the bottom and top coats of this block were the same as for the first pavement, but a different method of construction was used. The excavation and gravel fill were made the same as the above, a 10-ton roller being used to secure a firm foundation. No forms or headers were used except where expansion joints were to be placed and the expansion joints were placed 60 feet apart running across the street at right angles to the curb line.

The engineers set stakes to grade about 10 feet apart over the whole area to be paved and the contractors worked to these stakes, which were pulled out as the top coat was put on. A day's work consisted of laying the pavement between the expansion joints and work was not stopped at night until this had been done. This method gave a continuous pavement between the expansion joints, which is the result sought for in all concrete work.

The top coat or finished surface was not marked or creased in any way, simply a very rough broom finish being used.

As this pavement has been in but a year and has not been subjected to very much traffic as yet, it is hardly fair to make a criticism at this time. It is situated, however, between the Milwaukee and Northern Pacific freight depots and in the course of the next two or three years will be given as hard a test as necessary to prove its value.

Were I to draw up plans and specifications for another concrete pavement, I believe I would proceed as follows:

Bottom coat, five and one-half inches thick, 1:2:4 mixture. Top coat, one and one-half inches thick, 1:1:1 mixture. The gravel or crushed stone in the bottom coat would be limited to two inches in diameter and in the top coat to one-half inch in diameter. I would place an expansion joint along the edge of the pavement and would place three-quarter-inch expansion joints every 60 feet transversely of the pavement. Then I would specify that the work between expansion joints should be pushed to completion without cessation.

For the finished surface I would specify a very rough broom finish, except that where the street was very steep I would allow marking. However, I do not regard concrete as slippery as asphalt pavement and would hesitate before allowing it to be marked at all.

At the end of the pavement a separate shoulder or curb should be constructed capable of being removed when the pavement is to be continued. This shoulder should have at least a 4-inch radius and with a 6-inch radius would be better.

If the finished surface is to be marked or creased I believe if the grooves were run at an angle of 45 degrees with the curb it might prevent the possibility of wearing into ruts.

CONCRETE PAVING IN BEMIDJI

By W. M. EVERTS, City Engineer

The city of Bemidji, Minn., has twelve blocks of paved street, all of concrete, which has been constructed during the years of 1910 and 1911. In 1910 two blocks were paved in one contract at a cost of $1.20 per square yard, and in 1911 ten additional blocks were let at 90 cents per square yard, the difference in cost being largely due to the change in specifications.

The pavements laid in 1910 were constructed as follows: The soil, which is sandy, was graded and thoroughly wet down, after which a base was laid consisting of five parts of clean, coarse gravel and one part of cement, this being made 5 inches thick and lightly tamped and leveled off so that the surface was parallel to that of the completed street. Immediately after this the wearing surface was placed, this consisting of two parts of sand (screened from the gravel) to one part cement, made into a very wet mixture and given a thickness of 1½ inches. The screenings resulting from this sand were thrown back into the gravel, and this resulted in an almost perfect mixture for the concrete. The wearing surface was leveled off with a straight edge, made slightly oval to conform to the completed surface of the street, floated with a wooden float and troweled with a long-handled steel trowel. When partly set it was roughened with an ordinary stiff broom, which left the surface slightly rough and quite satisfactory.

In this pavement one block 18 by 25 feet was laid in a different way as an experiment in a place where it would receive the heaviest wear from traffic. This square appears to be in as good condition as any of the pavement in regard to wear and cracks, and is more satisfactory in that it is rougher and horses are not nearly so apt to slip on it. For this reason, and also because it apparently would be cheaper to lay, the ten blocks laid in 1911 were constructed in accordance with this method rather than that employed for most of the 1910 pavement. This method was as follows: On the sub-base, prepared as in 1910, was laid 5 inches of concrete consisting of three and one-half parts of gravel and one part of cement, this being mixed so that it would run, or a fairly "sloppy" mixture, but not sufficiently so to cause water to form at the gutter and run off, carrying the cement with it. As soon as this concrete was placed it was leveled off with a straight edge to the desired completed surface of the street, floated with a wooden float and troweled with a long-handled steel trowel, all stones more than a half inch in diameter which were near the surface being raked out. After the concrete had partly set it was roughened with an ordinary stiff broom or a wooden float. As stated above, this pavement was laid at 90 cents per square yard (for the concrete alone), as against $1.20 for the two-layer pavement.

All of the concrete pavement in Bemidji has been laid in blocks, following the same general rule. The street is divided longitudinally into three sections or strips, with an 18-foot strip along each curb and a 16-foot strip in the

CONCRETE PAVEMENT AT BEMIDJI

center. There are several advantages in laying the pavement in three sections, one of the principal reasons in Bemidji being because a street car line is to be built in the center of the street, and this construction permits taking up the central strip of concrete without any injury to the side strips. Another advantage is that during construction traffic can continue to use the central part of the street, materials can be hauled over this part, etc., while the two side strips are being constructed. Then, when these have sufficiently hardened, they can be used for traffic and construction while the central strip is being laid.

A three-quarter inch expansion joint was placed along each curb, which was filled with paving pitch. Expansion joints were placed every 25 feet at right angles to the line of the street, these being not more than a half inch wide. The joints between the side strips and central strip were not properly expansion joints, but the edges of the side strips were painted with paving pitch before placing the central strip.

The gravel used in these pavements cost $1.50 per cubic yard and labor $2.25 per day. The cement cost $2.20 per barrel in 1910 and $1.80 in 1911. Conditions in Bemidji are exceptionally favorable for the laying of cement pavements, as we have a sandy soil and the very best aggregate for the mixture. In cities having a clay soil the cost would probably be increased 25 to 50 per cent. A poor quality of sand or gravel is more liable to cause failure of the pavement than poor cement.

The 1911 pavement was laid in the fall, and has not been down sufficiently long to demonstrate its wearing qualities, but the sample square laid in this way in 1910 is in good condition. In the rest of the 1910 pavement only two or three small cracks have appeared, and these are scarcely noticeable and certainly do no damage whatever to the pavement.

CONCRETE PAVEMENT IN SIOUX CITY

By KEYES C. GAYNOR, City Engineer

During the year of 1911 the city of Sioux City, Iowa, laid approximately four miles of concrete pavements on streets varying in width from 24 to 52 feet.

The construction of this pavement differed from that of many other concrete pavements in several important particulars, the points of greatest difference perhaps being that the pavement was made all in one mix and only five inches thick. It must be kept in mind, however, that these pavements were laid on streets where the traffic was light.

The specifications were as follows:

Sub-grade.

The street shall be graded down to a true crown as per plan of and stakes set by the city engineer. The ground after being dressed shall be thoroughly tamped with an 80-pound tamper, or rolled with a steam roller of not less than 10 tons, as may be required by the city engineer. All hollow places or other imperfections over or in trenches to be broken down and thoroughly consolidated with earth by tamping, or as otherwise directed, so that in the future maintenance difficulties therewith will be avoided. No allowance will be made for such defects. All soft or spongy material, whenever required, shall be replaced with gravel or broken stone at the contract price per cubic yard for such material. No earth shall be removed in preparation of the sub-grade below the base of the foundation, and any earth taken out below such line may be required to be replaced with gravel or broken stone, without extra pay. In all places wherein a filling is required to bring the bed to the required height it shall be done in layers not to exceed 6 inches in depth and thoroughly rolled to insure a solid bed. No allowance whatever will be made for any earth placed in embankment upon or removed from the street being paved. The contractor is to dispose of the extra dirt. The entire grading is to be included in the price per square yard for pavement.

Pavement.

Upon the sub-grade, prepared in accordance with these specifications, shall be laid the concrete pavement 5 inches in thickness after being compacted. The pavement to be mixed and laid as hereinafter stated.

Material

The cement shall meet the requirements of the standard specifications for Portland cement of the American Society of Civil Engineers and the American Society for Testing Materials, except that the briquettes mixed 1 cement and 3 of sand shall show a tensile strength of at least 240 pounds per square inch in seven days.

Fine aggregates shall consist of sand, crushed stone or gravel screenings, graded from fine to coarse, passing when dry a screen having ¼-inch diameter holes, shall be preferably of silicious materials, clean, coarse, free from loam, vegetable or other deleterious matter, and not more than 3 per cent. shall pass a sieve having 100 meshes per linear inch. Bidders are required to submit a sample of the sand they propose to use with their bids.

Coarse aggregates shall consist of inert material, graded in size, such as crushed jasper, granite or gravel, which is retained on a screen having ¼-inch diameter holes, shall be clean, hard, durable and free from all deleterious matter. Aggregates containing soft, flat or elongated particles shall be excluded.

The maximum size of the coarse aggregate shall not exceed that which will pass a 1½-inch ring.

All water used shall be supplied by the Water Department of the city and shall be furnished free to the contractor under the directions of the Water Department. All water used for mixing or otherwise shall be clean, free from oil, acid, strong alkalies or vegetable matter.

Expansion Joint Filler

The expansion joint filler shall be a suitable elastic, waterproof compound that will not become soft and run out in hot weather or hard and brittle and chip out in cold weather.

Forms

Forms shall be free from warp and of sufficient strength to resist springing out of shape. All mortar and dirt shall be removed from forms that have been previously used.

The forms shall be well staked to the established lines and grades.

All forms shall be wetted thoroughly before any materials are deposited against them.

Expansion Joints

Expansion joints ½ inch wide shall be placed across the street every 25 feet along the street and between the curbs or edges of the gutters and the pavement. All boards for expansion joints shall be made in the form of a template, cut to the desired shape of the street, according to plans for detail of each street, and shall not project above the finished pavement.

Mixture

The concrete for the base shall be so proportioned that the cement shall overfill the voids in the fine aggregate by at least 5 per cent. and the mortar shall overfill the voids in the coarse aggregate by at least 10 per cent. The proportions shall not exceed 1 part cement to 7½ parts fine and coarse aggregates.

When the voids are not determined the concrete shall have the proportions of 1 part cement, 3 parts fine aggregate and 4½ parts coarse aggregate.

The method of measuring the materials for the concrete, including water, shall be one which will insure separate uniform proportions at all times. The right is reserved to require measuring boxes of a type approved by the city engineer. A bag of cement shall be considered to have a volume of 1 cubic foot, subject to measurement if so desired by the city engineer.

The ingredients of the concrete shall be thoroughly mixed dry, sufficient water added to obtain the desired consistency, and the mixing continued until the materials are uniformly distributed and the mass is uniform in color and homogeneous.

When the conditions will permit, a machine mixer of a type which insures the uniform proportioning of the materials throughout the mass shall be used.

When it is necessary to mix by hand the mixing shall be done on a water-tight platform and the materials shall be turned until they are homogeneous in appearance and color.

The materials shall be mixed wet through to produce a concrete of the consistency that will flush readily under light tamping, but which can be handled without causing a separation of the coarse aggregate from the mortar and which will not creep toward the curb or sag out of place when deposited and lightly tamped.

Retempering—that is, remixing with more water, mortar or concrete that has partially hardened—will not be permitted.

The concrete shall be deposited in strips extending the full width of the area paved. After the addition of water the mixture shall be handled rapidly to the place of final deposit. Under no circumstances shall concrete be used that has partly hardened.

Concrete shall not be mixed or deposited when the temperature is below freezing, and shall be protected against frost until thoroughly hardened. Concrete shall not be mixed or deposited when the temperature is too high, and all work shall be covered as directed by the city engineer.

Workmen shall not be permitted to walk on freshly laid

concrete, and where sand and dust collect on the base it shall be removed carefully before the wearing surface is applied. A practical skilled workman shall do the spreading of the concrete and the finishing of the surface.

Wearing Surface

After the concrete is deposited it shall be tamped as directed by the city engineer and his inspector on the job. After the tamping, dry mixture, mixed 1 part cement and 1 part fine aggregate, is to be spread over the surface in sufficient quantity to take up the surplus moisture. The surface must be then floated to true grade. If the concrete has not been graded to get a surface sufficiently true it shall be brought to a true surface by a mixture of 1 part cement and 1½ parts coarse sand before the dry mixture is applied.

The wearing surface shall be spread on the base immediately after mixing, and in no case shall more than 50 minutes elapse between the time that the concrete for the base is mixed and the time the wearing surface is floated.

The wearing surface shall be finished with a wood float, and before it has completely hardened it shall be roughened by brushing with a stiff vegetable fibre brush or broom.

When the surface is to be corrugated the grooves shall be approximately three-eighths of an inch deep and one-fourth of an inch wide, with the edges neatly rounded to prevent chipping or spalling. The grooves shall be perpendicular to the axis of the street, and be approximately 6 inches, center to center. After grooving the surface shall be roughened by brushing as above specified.

Protection

When complete the pavement shall be well sprinkled with water for a period of at least three days, and shall not be thrown open to traffic until the engineer so directs, and shall be covered with 1 inch of yellow clay, if so directed by the city engineer.

In laying the pavement, work shall be started at the bottom of a grade and carried up.

Some points in the specifications are especially worthy of note. The method of preparing the sub-grade contains nothing new for this locality, but it might be pointed out that it would not be well to follow that system where the ground would heave under frost action.

A peculiar characteristic of the soil in Sioux City is that it does not heave under the action of the frost. Houses can be built with their foundations on top of the ground and not be disturbed by the coldest winters. Therefore it is not necessary to use any sub-drains or give the sub-grade any further treatment than a thorough rolling wherever ditches exist or a fill is made.

During this past winter the thermometer has gone as low as 35 below zero, but the pavement shows no ill effects therefrom. Owing to this fact it is apparent that it is necessary to make the pavement only thick enough to have sufficient body to withstand the pounding. The use of only a 5-inch pavement might be open to criticism in some instances, but under the existing condition in Sioux City it has given very good results.

The 7-day sand test of 240 pounds may seem high, but De Mars sand is used instead of standard Ottawa sand and no difficulty is experienced by the cement people in meeting the requirements.

Another special feature is the stone. Although gravel was admitted in the specifications, only the Sioux Falls jasper was used, and it was owing to the fact that this kind of stone, which is very hard, was obtainable that a one-course or one-mix pavement was possible.

As perhaps with all concrete pavements, the expansion joints gave the most trouble. The expansion joint is the keynote of a concrete pavement. Considerable experimenting was done with tar paper contraction joints and contraction joints without tar paper; the purpose being to insert a joint or drying crack between the larger expansion joints in order to make fewer large joints, but the experiments were not very successful.

The proposition is simply this: Expansion joints are the very weakest part of the pavement, consequently they ought to be put as far apart as possible. Just how far apart is questionable. If the joints are too far apart the pavement will crack in between them. Such cracks may be seen at Windsor, Ontario, but as yet they do not seem to have done any particular damage. However, they look bad and are a reflection on the pavement and ought to be avoided if possible. In the four miles of pavement laid last year in Sioux City there is only one crack, and that one came almost before the cement had set and where an expansion joint should have been.

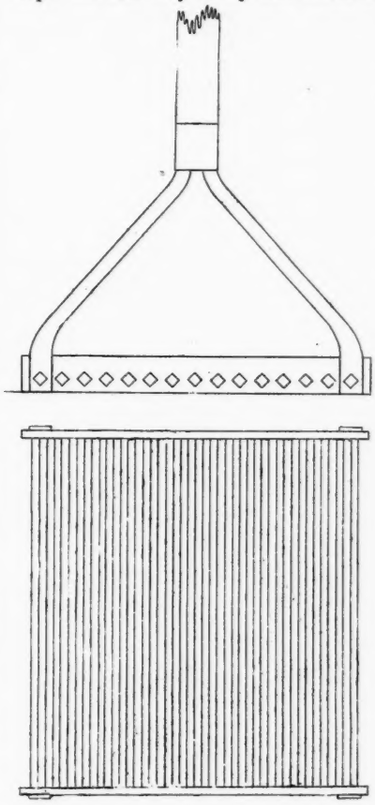
The joints, generally speaking, were placed 22½ feet apart along the street and with two exceptions no joints were placed parallel with the street except along the curbs. Joints parallel with the street, when they are traveled over, break off and wear down.

The forms at the expansion joints were allowed to stick up above the surface of the pavement, which made it very difficult to keep both sides of the joints at the same elevation. It is very important, however, that this be done, because if one side of a joint is the least bit higher than the other, both sides wear down.

The edges of the expansion joints were made with a special tool and after the workmen became used to the work the joints were fairly satisfactory. It will require several years' use, however, before one can say that such a joint is thoroughly satisfactory. Wooden boards were used for forms. They came out fairly well after the men found out how to handle them, but they were not at all satisfactory.

It is quite possible that some metal joint, like the Baker joint, which is used in Wayne County, Mich., will prove to be better than a plain concrete joint.

The section of the specifications dealing with the wearing surface might be a little misleading without some explanation. In order to use a one-mix pavement and still be able to get a smooth pavement, it required a little special treatment. The writer designed a special tamper, shown in the illustration, the purpose being to drive the stone down from the surface and bring the mortar to the top. In this way a top was secured which could be worked with the wooden floats and a good surface secured. As a matter of fact the tamping brought so much soft material to the top that it required considerable dry mixture to take up the surplus moisture. As a result of the tamping and dry mixture a top was secured which showed practically no stone. The surface was finished with a wood float.



TAMPER FOR CONCRETE PAVING, SIOUX CITY, IA.—15 ⅜-IN. SQ BARS 12 IN. LONG, SPACED ¾-IN. CENTERS; 2 BARS ½x1¼x11½ IN., AND A WOODEN HANDLE.

Corrugations at right angles to the direction of the street were put at intervals of six inches on grades greater than 7 per cent. The marks were made with an ordinary sidewalk jointer and were not particularly satisfactory on account of the fact that the line was too narrow.

It was never found necessary to

cover a street, but care had to be taken on hot days not to begin the sprinkling too soon after the pavement had been laid.

Concrete pavements have been laid in alleys in Sioux City for several years and have proven very satisfactory indeed. The chief points of failure have been lack of expansion joints, giving "lightning" cracks and an improper surface, although there has been little trouble with the surface where no top coat was used.

In conclusion: The above described pavement has been laid on a soil which will not heave, on streets where the traffic is light and with a stone which is very hard. In another city where the soil heaves it would probably be better to use a thicker pavement and perhaps make other provisions. If only a soft stone is available it would probably be better to use a two-mix pavement. In other words, the kind of a concrete pavement to lay in any given place depends upon certain conditions of that place and on the materials available.

Contracts have recently been let for three miles of concrete pavement on a street where the traffic is very much heavier than on the streets paved last year. On account of the heavy traffic the mixture has been changed to one part cement, two parts sand and three parts stone.

BITUMEN SURFACING FOR CONCRETE

By C. H. VINAL, City Engineer, Appleton, Wis.

THE city of Appleton, Wis., began laying concrete pavements in 1908, and has laid some each year since then, and all are giving good satisfaction. This material and asphalt are used on the residence streets, while the main streets are paved with either creosoted wood block, brick or sandstone. The alleys are paved with what is known as No. 2 concrete, and there is also a residence street seven blocks long paved with the same material. This last was laid in 1908, and a part of it surfaced with common gas house tar. This was done largely in the way of an experiment, but good results were obtained even with this treatment. We have a number of concrete pavements which have been laid one, two and three years, some having their surfaces treated with bitumen and some not, and all are giving the best of satisfaction.

The bitumen treated pavements are not as noisy or dusty as the others, and this treatment protects the concrete, and I am of the opinion that it is best to use the bitumen surfacing. The life of this surfacing is about three years under ordinary traffic. It should be renewed when worn away, but the cost of this is very small. In experimenting to find the best material for this surfacing I have used raw gas house tar, distilled tar, tar and asphalt mixed, asphalt and oil mixed, and asphalt alone; all with good results. I believe that concrete pavements laid under proper specifications and *faithfully inspected* will give any city its money's worth in comparison with any other pavement, even in cold countries where the range of temperature is 130 degrees or more.

Our pavements have been constructed in the following way: After the sub-grade has been rolled it is covered with two inches of sand and cinders mixed in equal proportions, and these are wet down and rolled or tamped. The mixture for the No. 2 concrete pavement consists of 1¾ barrels of Portland cement, 1½ yards of clean, sharp sand and one yard of crusher run of limestone with the dust removed. The concrete is laid to a thickness of seven inches and the top flushed to a smooth surface and broomed with a coarse broom crosswise of the street or alley. Three-fourths-inch transverse expansion joints are placed every 40 feet, longitudinal ones extend along each curb, and similar joints are placed along marginal curbs, around all manholes or other fixtures. These joints are filled to within ½ inch of the top with pioneer asphalt, or other equally as good, poured at a temperature of not less than 300 degrees, and the remaining ½ inch is filled with sand or fine stone chips.

In the No. 1 pavements the base is made as for No. 2, but 5 inches thick, and on this is placed a 1¾-inch wearing surface composed of one part cement and 1½ of crushed limestone, trap or granite from which all dust has been removed, the kind of stone depending upon the nature of the traffic to be carried. This surface stone is graded as nearly as possible so that 40 per cent. shall be ¼-inch size, 20 per cent. ⅛-inch size, 15 per cent. 1/16-inch size and the remaining 25 per cent. sand. This material and the cement are mixed together dry and are then wet and placed on the concrete base and worked or floated to the proper surface. This surface is then roughened by drawing a tool similar to a garden rake both crosswise and lengthwise of the street so as to cut the surface into squares about 2½ inches in size, the scorings being about ½ inch deep.

When the surface has dried it is covered with a skim coat of asphaltic cement, which has been heated to a temperature of at least 300 degrees, and is spread evenly over the surface by the use of mops, brooms or squeegees. This asphaltic coat averages about ⅛-inch thick. On this is spread evenly a dressing of fine stone chips heated to a temperature of at least 250 degrees, enough chips being used to cover the entire surface.

In the No. 1 pavement also there are ¾-inch transverse expansion joints every 40 feet, and if the pavement is more than 28 feet wide a longitudinal expansion joint runs continuously through the center of the roadway. Expansion joints are also placed along each curb, around manholes, etc., as in the case of No. 2 pavement, and all joints are filled in the same way. The transverse joints and the central longitudinal one have their edges protected with 2½ x 2½-inch steel angles, which are rolled with a corrugated or diamond surface to prevent their being slippery, and which are anchored in the concrete with anchor bolts. These angles are also used in the transverse expansion joints in No. 2 pavement. These the writer believes to be a very good thing, protecting the concrete pavements where they are most liable to fail.

CONCRETE PAVEMENTS IN GREENVILLE

By H. N. BAUMBERGER, City Engineer

GREENVILLE, Ill., is located in the center of one of the largest dairy districts of the United States, and the highways leading to and through the city are subjected to a daily traffic of narrow-tired wagons, which badly cut up the dirt roads. A few years ago the State Highway Commission built a mile of water-bound macadam in the city, which produced such a favorable impression that the city voted a special tax levy for five years to build several more miles of macadam.

In the summer of 1910 several wealthy farmers living along a narrow road raised $4,500 to construct an experimental concrete pavement along about 3,900 feet of this, the roadway being made 16 feet wide. The total thickness of the concrete was made 6½ inches, 5 inches of this being a 1:6 base and a finishing coat of 1:2 mortar 1½ inches thick being added. Fine sand was used for the finishing coat, such as is ordinarily used for cement sidewalks. Expansion joints were placed across the pavement every 25 feet, these being filled with three layers of tar paper at first, and later with builders' felt. The materials used, with the exception of the cement, were of poor quality; dirty pond water was used, and the mixing was done with a hand mixer rigged up to run with a gasoline engine. Moreover no gravel sub-base was specified, although the sub-soil was clay and the season an unusually wet one. After fifteen months' use nearly three-fourths of the blocks were cracked across the entire width parallel with and midway between the transverse expansion joints, and there is also a crack extending down the center of the pavement for

almost its entire length. The surface coat has spalled off in several places, and holes worn rapidly into the base. In spite of these mistakes in construction, and defects in the pavement, the latter have been repaired at small expense and the pavement now shows few signs of wear. The contract price for this pavement was 65 cents per square yard, exclusive of the excavating and preparation of the roadbed.

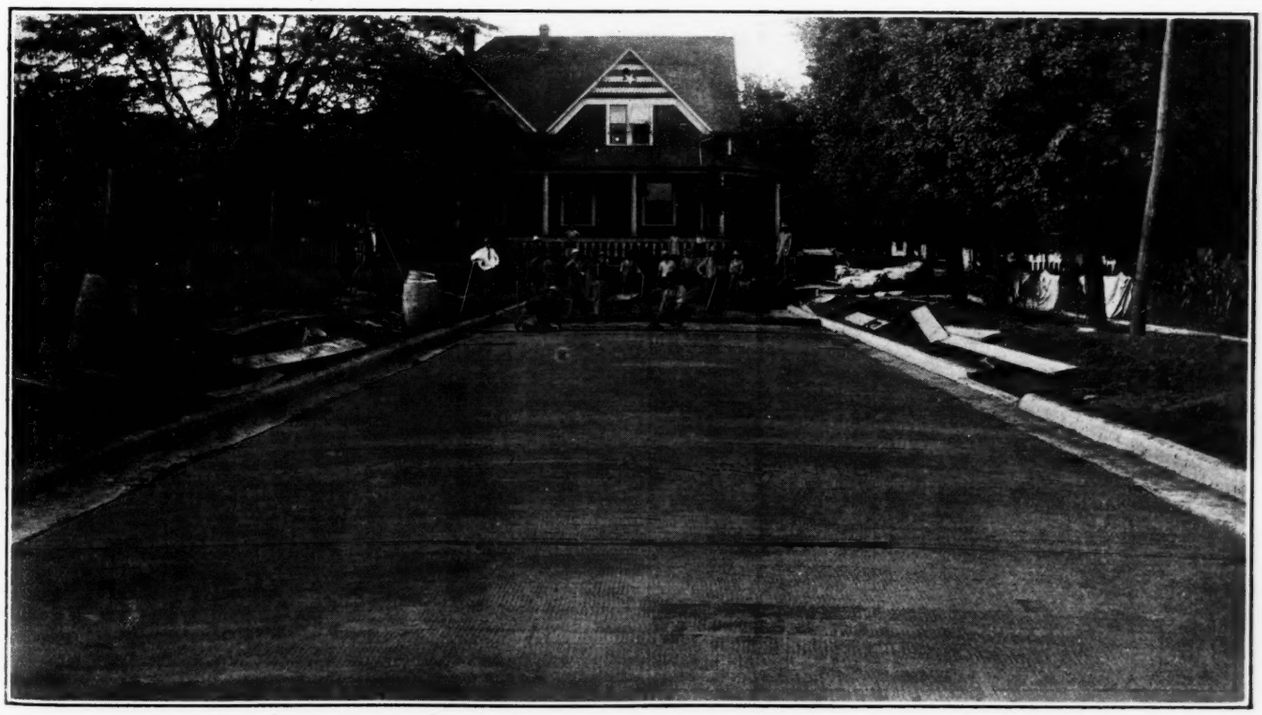
Concluding that this pavement was a move in the right direction, although being a long way from perfection, the highway commissioners decided to substitute concrete in place of macadam, which it had been voted to use on a road across a creek bottom. A new right of way was bought, and no attempt was made to elevate the roadway above high-water mark and provide culverts, as had been intended if macadam were used. This saved the cost of 3,000 feet of fill and three cement culverts. The pavement was made 16 feet wide, and consisted of 8 inches of Portland cement concrete, mixed one part cement, 2½ clean, sharp sand, and 5 of broken limestone. Three-fourth inch expansion joints filled with paving pitch were placed across the pavement at 25 feet intervals. A machine mixer was used, and the concrete made of such consistency that when well tamped a sufficient amount of cement and sand mortar would flush to the top to give a smooth finish. Eight-inch stringers were used for forms, one being placed one inch lower than the other. The only finish given to the top surface was that resulting from the use of a hand tamper by an experienced man. Great care was taken to insure that both sides of each expansion joint be at exactly the same elevation, so that the jar to and by the traffic on the edge of the joint would be minimized. No cracks have appeared in this pavement, nor any signs of wear developed. The contract prices were 20 cents for excavating, 92 cents per square yard for finished pavement, and 2½ cents for expansion joints. The broken stone was furnished free to the contractor at the railroad yard, but cost him 50 cents on the job. Sand cost 80 cents per yard, cement $1.22 per barrel and labor $1.75 for a nine-hour day.

Last year the city built 3,500 square yards of concrete pavement, with combined curb and gutter of the same material and mixture. This pavement was constructed as follows: On the prepared sub-grade concrete mixed one part cement to four parts of sand and gravel was laid to a depth of 6 inches. This was deposited in strips extending across the full width between curbs as soon as possible after mixing, and was tamped to a uniform surface with hand tampers, the concrete being mixed of such consistency that the cement would flush to the top when tamped. The surface was then given a smooth finish, and before it had set was given a brush finish and corrugated with a roller made for that purpose. These corrugations show quite plainly in the accompanying photograph. Expansion joints were made between the pavement and the curb, across street intersections on a line with the edge of the gutter, and across the pavement every 25 feet. These extended entirely through the pavement, and were a half inch wide, filled with paving pitch. As in the case of the road described above, great care was taken to see that the edges of the pavement on the two sides of each cross expansion joint were at exactly the same elevation.

Before deciding on the 1:4 mixture a number of tests were made of the "run of bank" gravel, and we found that this proportion gave an excess of cement of about 7 per cent. This contract was performed by G. L. Loggins, using a 40-yard "Systematic" mixer, who laid and finished an average of 350 square yards per day. The contract prices were: Excavating, 24 cents; curb and gutter, 26 cents; expansion joint, 2½ cents; finished pavement, 75 cents per square yard. The cement cost $1 per barrel; sand and gravel, 80 cents per cu. yd.; labor, $1.75 per day.

This pavement cost 45 per cent. less than brick, is practically noiseless in comparison, affords a good foothold for horses, and is easily cleaned. We are so sure that this street is a success that we are preparing to let a contract for 8,000 square yards more to be laid in the same way.

My experience has been that it is very important to have a clean, even mix of uniform consistency. Clean water, sand and gravel, free from clay, loam and other foreign matter, must be used to get the best results. I believe it is a mistake to attempt two-coat work on pavements, not only from an economical standpoint, but also from the fact that the thin upper coat jars loose from the lower and easily spalls off.



LAYING CONCRETE PAVEMENT AT GREENVILLE, ILL.

PREPARED FILLER MACADAM

Intermediate Between the Penetration and Mixing Methods —Advantages Over These—Method of Construction Materials—Hand or Machine Mixing

In a report just issued by the Office of Public Roads dealing with "New Hampshire Highways," Charles H. Hoyt, superintendent of construction, describes a method of constructing bituminous macadam which originated with him and which he calls the "prepared filler" method. His description is as follows:

Constructing bituminous macadam by the use of a prepared filler is new in this country. It combines practical convenience in manipulation with thorough construction, and falls between the other two methods referred to in first cost. In fact, it can be built for very nearly the same cost as the penetration method.

The ordinary water-bound macadam served its purpose for many years, until traffic conditions changed and became more severe, thus requiring a more tenacious road surface to resist the forces that come upon it.

In the destruction of a water-bound macadam surface by the rapidly moving vehicles and hoofs the larger stones are not moved out of place first, but the screenings and smaller material around the larger stone are pulled or pushed out of place, leaving the large stone loose, which makes a rough and raveled surface.

The prepared-filler method seeks to remedy this condition by coating this fine material, which has heretofore been disturbed, with a bituminous binder before it is placed in the road around the larger stone. In this way the larger stones are bound and held in place by a material that is difficult to remove.

The actual construction is carried out very much the same as the plain water-bound macadam is built; that is, the foundation course is exactly the same as for a plain macadam. Then the top-course stone, varying in size from ¾ inch to 2 inches, is spread evenly to a depth of 3 or 4 inches, as may be specified for the depth of the top course while loose.

The next step, and while the top course stones are still loose, is to apply a layer of prepared filler spread evenly over them to a thickness equal to about four-tenths to five-tenths the depth of the layer of loose stone.

The prepared filler is made in the following way: To 1 volume of stone chips or pea gravel, varying in sizes from ⅛ to ¾ inch, are added about 40 per cent. by volume of clean, sharp sand and from 10 to 15 per cent. (by volume of the stone chips or gravel) of bituminous binder, which may be of any kind or quality that would be used by the penetration or mixing methods, although it would probably be of no advantage to use by this method the lightest grades of those binders that are specified for the penetration method.

CONSTRUCTION OF BITUMINOUS MACADAM BY THE PREPARED FILLER METHOD AT ITHACA, N. Y.

The stone chips or pea gravel, sand and bituminous binder are heated or not as may be required to secure a uniform mixture, and then they are thoroughly mixed together either on a board with shovels or in a machine mixer.

After the layer of prepared filler has been spread over the top course of stone, it is then worked down into that course with rakes, or by harrowing with a light steel spike-toothed harrow, the teeth of which are about ½ inch square, set close together, and about 3 inches in depth. The harrowing should continue only until the top course stone begins to appear through the layer of the prepared filler, and then the surface is rolled with a 10-ton roller until it is firm.

More of the prepared filler may be sprinkled over the surface to cover bare spots as the rolling progresses, and, if desired, after the first rolling has been finished, a surface coat about ¾ inch in thickness of the prepared filler may be applied and the surface re-rolled.

Two sections of road—one 50 feet long, the other 75 feet long and 16 feet wide (see cut)—were built by this method under the supervision of the writer in September, 1910, at Ithaca, N. Y., on East avenue, passing Cornell University campus. On the 50-foot section, after the first rolling had been finished, a paint coat of about one-half gallon of oil asphalt per square yard was applied and covered with stone chips. On the 75-foot section a surface coat about ¾ inch thick of the prepared filler was applied as described above. An oil asphalt binder was used for the 50-foot section and a cut-back oil asphalt was used for the 75-foot section. These two sections are now in excellent condition.

By using the proportions of materials stated for the prepared filler—that is, 1 volume of the stone chips or gravel, 40 per cent. of sand and 10 per cent. of bituminous binder —there are required for a layer 1 inch thick over 1 square yard of road surface the following amounts of material: 0.028 cubic yard of chips, 0.0112 cubic yard of sand, 0.0028 cubic yard of bitumen, or 0.567 gallon per square yard.

If 15 per cent. of bitumen is used, then 0.85 gallon per square yard is required.

Assuming that a layer 2 inches in depth of the prepared filler is used, the 10 per cent. filler will require 1.134 gallons of bitumen per square yard of road surface, and the 15 per cent. filler will require 1.7 gallons of bitumen per square yard. The sand is used to serve a twofold purpose, one of which is to fill a part of the voids and the other, which is the principal reason for its use, is to control the consistency of the mixture so that it can be manipulated freely. The amount of sand required can be determined by a few trials and will vary with the kind and amount of binder used.

It is better to harrow or rake the prepared filler into the top course as soon after the filler is spread as possible; however, no difficulty was experienced in harrowing in a section of the filler that had lain two hours after it was spread.

Some advantages of the prepared-filler method are:

(1) The amount of stone that is required to be heated is about one-half or less than the amount required to be heated by the mixing method, thus reducing cost and saving time over the all-mixing method.

(2) The amount of bitumen required is less than by the penetration method. The amount used can be well controlled and but very little wasted.

(3) The prepared filler can be applied evenly, and when worked into the top course it fills the voids and thus makes the surface comparatively solid and durable.

(4) The manipulation of the prepared filler is rapid and convenient. The heating and mixing can all be done at one place, such as the crusher site, and the prepared filler hauled to the road where it is to be applied.

(5) The prepared filler can be spread practically as well as dry screenings, and thus it is an economical and practical method of applying the bituminous binder, and the results obtained are a solid and substantial road.

SELECTION OF PAVEMENTS

Consideration of General Characteristics and of Economy—Comparison on a Basis of Annual Cost—Macadam the Most Expensive Pavement

The Bureau of Municipal Research of Cincinnati, O., has issued a report bearing the above title which was prepared by James E. Barlow and Rufus E. Miles, the engineer and director, respectively, of the Bureau. The importance of this question to Cincinnati is shown by the statement that over one million dollars per year is spent by the city directly for construction and maintenance of pavements, and if the item of interest on capital invested be included, the expense for pavements would be found to exceed $2,000,000.

The principal kinds of pavement in use in Cincinnati are granite, creosoted wood block, sheet asphalt, bitulithic, brick, bowlder and macadam, and the report briefly defines and describes each of these. The selection of one of these or of any kind of pavement for any particular street should, says the report, be made only after careful consideration of factors which may be grouped under (1) General considerations, such as smoothness, slipperiness, sanitary qualities, ease of cleaning, ease of traction, general acceptability, etc.; (2) Economy, involving first cost, durability and cost of repairs.

Concerning slipperiness, the report suggests the following as the maximum permissible grades for the pavements named:

	Per cent.
Wood block and asphalt	3
Brick	5½
Granite	8
Bowlder	10
Macadam	12

By the use of special hillside blocks the allowable grade for brick may be increased. On the other hand, macadam prepared with a bituminous binder, as is now common, is more slippery than the water-bound, and the maximum permissible grade would be less than here given.

With the matter of economy the report deals to somewhat greater length, and this part we abstract below as follows:

The most economical pavement to use under any given conditions is that which will show the lowest average cost per year during the entire period of its existence. A pavement having a relatively high first cost may, owing to its longer life or lower cost of repairs, prove ultimately cheaper than one lower in first cost. The average annual cost of a particular pavement may be defined as that amount of money which, if contributed annually, will, under the existing conditions, keep the street perpetually paved and repaired. The average annual cost is composed of three principal factors:

(1) Average annual cost of repairs.

(2) Interest on the cost of the pavement.

(3) Annual charge on account of sinking fund, i.e., a fund set aside and invested each year, such that the pavement, when worn out, will have been completely paid for.

This average annual cost might be imagined as a rental. If the streets were laid and kept in repair under a continuous contract with a private corporation, the average annual cost, as above described, plus profits, would make up the rent demanded by the corporation. In the long run the cost to the citizens under the present methods has to be figured in the same way.

In order to apply this principle to the selection of a pavement for a given street, certain exact data are necessary, such as the durability and cost of repairs of each kind of pavement under various conditions, especially those of traffic. Unfortunately such data are not available in many cities, but the principle, even when based on approximate data, may shed considerable light on the cost of pavements and suggest the most desirable selection for proposed pavements.

The price per square yard during the past four years in Cincinnati for the several kinds of pavement has averaged as follows: Granite, $3.70; wood block, $3.45; bitulithic, $2.65; asphalt, $2.30; brick, $2.25; granitoid, $2.10; macadam, 95c.; bowlder, $1.75. These prices include excavation equal to the total thickness of the pavement, consolidation of the sub-grade, a 6-inch concrete foundation and furnishing and laying the wearing surface complete. One dollar per square yard may be taken as a reasonable average price for concrete foundations, and the price for these pavements, except the macadam and bowlder, may be diminished by this sum to determine the cost of the wearing surface. The foundation should outlast several surfacings.

The average cost of repairs for individual pavements in Cincinnati is not known, but the gross amount expended annually for the past three years on each kind of pavement, divided by the total area of each kind of pavement as nearly as it could be ascertained, gives the following as the average cost per square yard per year for maintaining the several pavements:

	Cents.
Asphalt	7.3
Granite	2.6
Brick	1.2
Bowlder	3.3
Macadam	7.6

The cost of maintaining a cement concrete foundation is assumed to be negligible.

The sinking fund payments will, of course, depend upon the length of life of the pavement, and this will vary with the traffic, and to a certain extent with other considera-

AVERAGE ANNUAL COST OR RENTAL OF SEVERAL KINDS OF PAVEMENTS

	Granite.	Wood block.	Bit.	Asphalt.	Brick.	Bowlder.	Macadam.
First cost of surfacing	$2.70	$2.45	$1.65	$1.30	$1.25	$1.75	$0.95
Assumed life	25 yrs.	?	?	15 yrs.	15 yrs.	25 yrs.	8 yrs.
AVERAGE ANNUAL COST OF SURFACING							
Interest at 4 per cent. on cost of surfacing	0.108	0.098	0.066	0.052	0.050	0.07	0.038
Average annual cost of repairs	0.026	?	?	0.073	0.012	0.033	0.076
Annual charge for sinking fund	0.063	?	?	0.063	0.060	0.041	0.100
Oiling or watering	.....	.....	.....	.....	.....	.....	0.04
Total, surfacing	0.197			0.188	0.122	.....	.....
AVERAGE ANNUAL COST OF FOUNDATION	0.046	0.046	0.046	0.046	0.046	.....	.....
Total average annual cost per square yard	0.243	?	?	0.234	0.168	0.144	0.254

tions, such as climate, etc. It is assumed for the purpose of comparison that the life of granite is about 25 years, that of asphalt and brick 15 years, that of bowlder 25 years, that of macadam 8 years, while that of wood block and bitulithic are not known, since few pavements of either class have been in existence more than ten years. It is assumed, however, that a 2-inch bitulithic surface will last as long as a 3-inch asphalt surface, and that the cost of repairs would be the same.

On the basis of the above principles and the estimated costs and life, the accompanying table was prepared, showing the average annual cost per square yard of each of the several pavements for Cincinnati conditions. Perhaps the most significant fact brought out by this is the relatively low cost of brick, this being the most economical of the several pavements according to this paper, if we exclude bowlder, which is not considered a suitable pavement for any street. Macadam appears from this table to cost fully 50 per cent. more than does brick. In comparing the above annual costs the fact must not be lost sight of that the different classes of pavement are not ordinarily subjected to the same traffic conditions, and that the life of the several pavements are based on the assumption of traffic suitable to them. For instance, macadam would probably have a much shorter life than eight years if used where granite or wood block are ordinarily laid. The life of brick pavement is based on a heavier traffic than that for macadam, and this fact makes its economy even greater if we consider the life and wear of macadam under traffic conditions suitable for brick.

In the larger cities of Ohio brick now constitutes from 80 to 90 per cent. of the total area paved annually, while in the smaller cities of the State it is practically the only pavement of a permanent nature used. If brick had been used in Cincinnati on, say, half the area now improved with macadam, the city would now, on the basis of our figures, be saving over $100,000 a year, to say nothing of deriving many other advantages.

During the last four years a good beginning has been made in the keeping of records on the cost of repairs to individual streets. A system of records should give for each street the principal unit costs, the results of tests on materials used in its construction, annual expenditures for repairs, etc. This would amount practically to a history of each pavement. These records should be supplemented by more or less frequent traffic observation, especially on representative streets. In the course of several years the city would then have at its command local data of great value in deciding questions of pavement economics.

PAVING IN 1911 AND 1912

Official Figures for More Than Five Hundred Cities—Amounts of the Various Kinds of Paving Laid During 1911, and Those Anticipated for 1912—Repairs and Reconstruction—Methods of Assessing for Sidewalks, Curbs and Gutters

As has been the custom for several years past, Municipal Journal has collected during the past month figures concerning the amount of paving which was done by various cites in the United States during the year 1911, and in addition such figures as are now available concerning work which the various cities are expecting to do during the year 1912. Naturally, the latter figures are less complete than the former, since a great many of the cities have not yet decided what paving work they will carry out this year, and the matter was so indefinite that the engineers did not wish to give any estimates.

Reports were received from 526 cities. Table No. 1, showing the amounts of each kind of pavement laid during 1911, contains the figures of 460 of these, the remaining cities having replied that no paving work had been done by them during the year 1911. Table No. 4, which gives the estimates of work to be done this year, contains the figures from 334 cities. Other tables are given showing the amount of repair work done and the amount of resurfacing on old foundations or reconstruction, while Table No. 5 gives information concerning the amount of sidewalk, curb and gutter work done during 1911, together with the methods of assessing or otherwise paying for such work.

In obtaining this information cards were sent to the city engineers or street officials of all the cities of the country. As has always been the case, a considerable number of these were not returned; some undoubtedly because there was nothing to report—these being mostly the smaller cities and towns, others because the annual reports had not yet been made up and the figures were not available, and for various other reasons. Of the cities having a population of more than 30,000, as reported by the United States census, 52 per cent. are represented in our table, this percentage being practically the same as that for the smaller cities.

Table No. 1 shows that about 30,000,000 square yards of pavement were laid by the cities named, sheet asphalt leading with 7,260,000 square yards, or 24¼ per cent. of the total; brick second, with 21½ per cent., and the others as follows: Plain macadam, 14 per cent.; bitulithic, 9 2-3 per cent.; bituminous macadam, 5¾ per cent.; gravel, 5 2-3 per cent.; wood block, 5½ per cent.; concrete, 4¾ per cent.; stone block, 3½ per cent., and small amounts of bituminous concrete and asphalt block. Omitting the macadams and bituminous pavements, we have pavements on concrete foundations occurring in the following order: Sheet asphalt, brick, wood block, concrete, stone block, asphalt block. Some of the cities reported the amounts laid in miles only, and in making the above calculation it was assumed that a mile of pavement contained 18,000 square yards. This undoubtedly introduces a slight error in some cases, but it does not seem at all probable that this would be sufficient to change the order of sequence given above.

If we add to the amount of new construction of each class of pavement the amount of reconstruction of the same, as given in Table No. 3, and deduct therefrom the amount of each class which was replaced by some other kind of pavement during the year, we have the net increase of the various kinds of pavements as follows: Asphalt, 8,214,026; brick, 6,707,155; macadam, 4,166,443; bitulithic, 3,114,675; bituminous macadam, 1,848,678; gravel, 1,824,849; wood block, 1,744,188; concrete, 1,521,606; stone, 1,157,340; bituminous concrete, 723,609; asphalt block, 334,039.

Turning to Table No. 4, the amount of pavement which it is expected will be laid by 334 of these cities in 1912, we find brick leading, with a percentage of 27¼; asphalt a close second, with a percentage of 24½, and the others occurring in the following order: Macadam, bituminous macadam, concrete, wood block, stone block, bitulithic, gravel, bituminous concrete, asphalt block. About 12 per cent. of the whole amount reported was not assigned to any particular kind of pavement, but it was merely reported that the areas stated would be paved with a kind of pavement not yet determined upon. This is such a large area relative to the total amount under consideration that the final determination as to its distribution might easily change materially the order given above. In general, however, we see that it differs little from the order of pavements laid in 1911; brick and sheet asphalt changing places, wood block and concrete changing places, and both moving above bitulithic and gravel.

Table No. 2 gives the amount of each kind of pavement

(Continued on page 434.)

TABLE No. 1.

PAVING DONE DURING 1911.

Name of city.	Sheet asphalt.	Asphalt block.	Granite, sandstone or other stone block.	Brick or clay block.	Creosoted wood block.	Concrete.	Bitulithic.	Bituminous: Concrete.	Bituminous: Macadam.	Plain or water-bound macadam.	Gravel.	Other kinds
Alabama:												
Birmingham	.....	.....	.....	.....	.....	.....	63,305	.....	.....	.....	.....	.....
Corey	.....	.....	.....	.....	.....	.....	526	.....	.....	.....	.....	.....
Dotham	.....	.....	.....	18,054c	.....	.....	.....	.....	.....	.....	.....	.....
Florence	.....	.....	.....	.....	.....	.....	.....	.....	.....	17,600c	.....	.....
Huntsville	0.25	.....	.....	2	.....	3	.....	.....	3.75	15	.....	.....
Mobile	.....	.....	.....	.....	33,000	.....	.....	.....	.....	.....	.....	.....
Montgomery	.....	.....	.....	.....	.....	.....	22,245	.....	.....	.....	.....	.....
Arizona:												
Phoenix	.....	.....	.....	.....	.....	.....	22,824	.....	.....	.....	.....	.....
Askansas:												
Fayetteville	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2c	.....
Fort Smith	.....	.....	.....	10	.....	.....	.....	.....	.....	.....	.....	.....
Little Rock	.....	.....	.....	.....	53,047	.....	.....	.....	.....	.....	.....	.....
California:												
Berkeley	2,800c	.....	.....	.....	.....	.....	.....	.....	.....	63,000c	.....	.....
Fresno	.....	.....	.....	.....	.....	.....	.....	11,100c	.....	.....	.....	.....
Grass Valley	.....	.....	.....	.....	.....	.....	.....	17,600c	.....	13,000M	.....	.....
Los Angeles	12.65c	.....	.96c†	.....	.....	.....	.....	1.90c‡	.....	.....	21.96c	.....
Marysville	14,112c	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Modesto	4.88c	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pasadena	.....	.....	.....	.....	.....	.....	46,089	.....	.....	.....	.....	.....
Sacramento	51,620c	.....	.....	.....	.....	.....	.....	15,874c	176,329c	.....	.....	.....
San Bernardino	.5c	.....	.....	.....	.....	.....	.....	.....	2.5c	.....	4M,	M 2
San Jose	28,295c	.....	.....	.....	.....	.....	.....	.....	.....	.....	.3c	.....
Santa Barbara	2c	.....	.....	.....	.....	.....	.....	.....	.5c	.....	.....	.....
Santa Cruz	.....	.....	.....	.....	.....	.....	.....	.....	.....	8,786c	.....	.....
Stockton	.....	.....	.....	.....	.....	5,780c	.....	2,880c	52,000c	54,300c	2,000c	.....
Vallejo	25,000c	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Colorado:												
Boulder	.....	.....	.....	.....	.....	.....	.....	.....	7,550M	.....	14,000	.....
Grand Junction	.....	.....	.....	.....	.....	17,000M	.....	.....	.....	.....	.....	.....
Connecticut:												
Bridgeport	.....	.....	.....	.....	50,000	.....	.....	.....	.....	.....	.....	.....
East Hartford	.....	.....	.....	.....	.....	.....	.....	.....	.....	11,000	.....	.....
Hartford	8,439c	.....	.....	.....	.....	.....	.....	.....	7,800M	16,000M	.....	.....
Meriden	.....	.....	.....	.....	.....	.....	.....	.....	1,338	.....	.....	.....
New Haven	.....	.....	.....	.....	13,000	.....	.....	.....	.....	.....	.....	.....
New London	.....	.....	.....	5,380c	.....	.....	.....	.....	27,645M	.....	.....	.....
Norwalk	.....	.....	.....	.....	20,000	.....	.....	.....	.....	.....	.....	.....
Norwalk	.....	.....	5,860	2,800	.....	.....	.....	3,600	.....	.25	.....	.....
Stamford	.....	.....	.....	.....	2,000	.....	.....	.....	.....	.....	.....	.....
Torrington	.....	.....	.....	.....	.....	.....	.....	.....	3,684M	80,191	.....	.....
Wallingford	.....	.....	.....	.....	.....	.....	.....	.....	.5c	.....	.....	.....
Delaware:												
Milford	.....	.....	.....	.....	.....	2,100c	.....	.....	.....	.....	.....	.....
Wilmington	.....	.....	2,425M	.....	.....	3,688M	6,365M	9,130M	13,778M	.....	.....	.....
District of Columbia:												
Washington	16,547c	11,557c	.....	.....	.....	.....	.....	.....	10,000	26,387c-M	.....	.....
Florida:												
Gainesville	.....	.....	.....	25,000	.....	.....	.....	.....	.....	.....	.....	.....
Palatka	.....	.....	.....	60,000c	.....	.....	.....	.....	.....	.....	.....	.....
Pensacola	.....	.....	.....	.....	70,000	.....	.....	.....	.....	.....	.....	.....
St. Petersburg	.....	.....	.....	2.25c	.....	.....	.....	.....	.....	.....	.....	3c
Georgia:												
Americus	.....	.....	.....	2,400c	36,353c	.....	.....	.....	.....	.....	.....	.....
Atlanta	.....	.....	.....	.....	35,000	.....	59,808	.....	.....	.....	.....	.....
Columbus	.....	.....	.....	24,542c	.....	.....	.....	.....	41,091M	.....	.....	.....
Dublin	.....	.....	.....	33,000c	.....	.....	.....	.....	.....	.....	.....	.....
Newnan	.....	.....	.....	.....	13,000	.....	.....	.....	.....	.....	.....	.....
Rome	.....	.....	.....	.....	22,500	.....	.....	.....	.....	.....	.....	.....
Waycross	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4
Idaho:												
Boise	32,626c	.....	.....	.....	.....	23,166c	.....	.....	9,876c	.....	.....	.....
Illinois:												
Alton	.....	.....	.....	42,814	.....	.....	.....	.....	.....	.....	.....	.....
Belleville	.....	.....	.....	.....	1,710	.....	.....	.....	.....	.....	.....	.....
Bloomington	.....	.....	.....	39,846	.....	.....	.....	.....	.....	.....	.....	.....
Chicago	960,810c	.....	134,519c	468,519c	237,912c	9,353c	.....	23,651c	45,890c	247,813c	.....	.....
Danville	.....	.....	.....	10,000	.....	.....	.....	.....	9,540	.....	.....	.....
De Kalb	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.3M	.....
Greenville	.....	.....	.....	.....	.....	8,500c	.....	.....	.....	1.75c	.....	.....
Highland Park	.....	.....	.....	.....	.....	.....	.....	.....	28,000	3,900	.....	.....
Lake Forest	.....	.....	.....	.....	.....	.....	.....	18,000c	.....	.....	.....	.....
Marion	.....	.....	.....	7,040c	.....	.....	.....	.....	872c	.....	.....	.....
Mattoon	.....	.....	.....	16,000	.....	6,000	.....	.....	.....	.....	.....	.....
Moline	.....	.....	.....	45,975	.....	.....	.....	.....	.....	.....	.....	.....
Normal	.....	.....	.....	16,000c	.....	.....	.....	.....	.....	.....	.....	.....
Oak Park	.....	.....	.....	3,612c	.....	.....	.....	14,543c	.....	19,200c	.....	.....
Paris	....	.....	.....	4,500c	.....	.....	.....	.....	.....	.....	.....	.....
Pekin	.....	.....	.....	100,000c	.....	.....	.....	15.000c	.....	.....	.....	.....
Peoria	.....	.....	.....	.....	4,925	.....	.....	.....	.....	.....	.....	.....
Pontiac	.....	.....	.....	10,000	.....	.....	.....	.....	.....	.....	.....	.....
Rockford	.....	.....	.....	15,240	.....	.....	.....	.....	57,420	.....	.....	.....
Springfield	2,200c	.....	.....	58,899c	.....	.....	.....	.....	.....	.....	.....	.....
Streator	.....	.....	.....	23,000c	.....	.....	.....	.....	.....	.....	200M	.....
Waukegan	.....	.....	.....	1,130c	.....	.....	.....	.....	.....	.....	.....	.....
Indiana:												
Anderson	.....	.....	.....	21,671	.....	.....	.....	.....	4,792	.....	2,918	.....
Bedford	.....	.....	.....	8,040	.....	.....	.....	.....	.....	.....	.....	.....
Bloomington	.....	.....	.....	10,000c	.....	.....	.....	.....	.....	10,000c	.....	.....
East Chicago	.....	.....	.....	19,412	.....	.....	.....	64,068	.....	4,018	.....	.....
Fort Wayne	31,424	.....	.....	47,603	.....	.....	.....	.....	26,822	.....	.....	1,883
Greencastle	.....	.....	.....	.....	.....	.....	.....	.....	10,000c	.....	.....	.....
Huntington	.....	.....	.....	.....	.....	1,500c	.....	.....	8,000c	.....	.....	.....
Kokomo	10,390	.....	.....	11,903	.....	.....	.....	.....	.....	7,400	.....	.....
Logansport	59,802c	.....	.....	4,508c	.....	.....	.....	.....	.....	.....	18,000c	.....
Mishawaka	2,244c	.....	.....	17,629c	.....	.....	21,140c	.....	.....	.....	.....	.....
Muncie	.....	.....	.....	36,993c	.....	3,835c	.....	.....	.....	15,000M	.....	.....
Noblesville	.....	.....	.....	33,218c	.....	.....	.....	.....	.....	.....	6c	.....
Richmond	.....	.....	.....	11,651c	.....	4,745c	.....	.....	.....	16,000c	.....	.....
Rushville	.....	.....	.....	14,530c	.....	.....	.....	.....	.....	.....	.....	.....
South Bend	.....	.....	.....	5,911c	.....	.....	.....	.....	17,644c	.....	.....	.....
Wabash	25,277c	.....	.....	3,557c	.....	.....	.....	.....	.....	9.570c	.....	.....
Washington	.....	.....	.....	.....	.....	.....	.....	.....	.....	5,800c	4,800c	.....

* For footnotes, see page 431.

TABLE No. 1—PAVING DONE DURING 1911 (Continued)

Name of city.	Sheet asphalt.	Asphalt block.	Granite, sandstone or other stone block.	Brick or clay block.	Creosoted wood block.	Concrete.	Bitulithic.	Bituminous—Concrete.	Bituminous—Macadam.	Plain or water-bound macadam.	Gravel.	Other kinds
Iowa:												
Ames	.....	.....	.....	.....	6,667c	.....	.....	.....	.....	.....	.....	.....
Burlington	.....	.....	.....	3,750c	.....	4,488	.....	1,698	.....	.....	.....	.....
Cedar Rapids	.....	.....	.....	50,870c	7,356c	2,175c-M	.....	.....	.....	.....	.....	.....
Chariton	.....	.....	.....	19,000c	.....	.....	.....	1,200c	.....	.....	.....	.....
Clarinda	.....	.....	.....	.....	.....	15,000c	.....	.....	.....	.....	.....	.....
Dubuque	.....	.....	.....	4,894	.....	388	.....	.....	14,006	41,457	.....	.....
Fort Dodge	12,000c	.....	.....	.....	4,500c	18,000c	.....	.....	.....	.....	.....	.....
Independence	.....	.....	.....	18,800	.....	.....	.....	.....	.....	.....	.....	.....
Iowa City	.....	.....	.....	.....	.....	.....	16,879	.....	.....	.....	.....	.....
Lake City	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,000M	.....
Maquoketa	.....	.....	.....	.....	2,902	.....	.....	.....	.....	.....	.....	.....
Marshalltown	.....	.....	.....	.....	.....	7,000c	.....	.....	.....	.....	.....	.....
Mason City	.....	.....	.....	.....	300	40,000	.....	.....	.....	.....	.....	.....
Muscatine	.....	.....	.....	.....	.....	.....	17,718c	.....	.....	.....	.....	.....
Ottumwa	.....	.....	.....	3,200	.....	.....	.....	.....	.....	.....	.....	.....
Sioux City	.....	.....	.....	.....	.....	100,000c	.....	.....	.....	.....	.....	.....
Waterloo	58,700c	.....	.....	.....	.....	.....	.....	.....	.....	2,500	.....	.....
Kansas:												
Atchison	.....	.....	.....	17,850c	.....	.....	.....	.....	.....	.....	.....	.....
Clay Center	.....	.....	.....	3,250M	.....	.....	.....	.....	.....	.....	.....	.....
Coffeyville	.....	.....	.....	17,400c	.....	.....	.....	.....	.....	.....	.....	.....
Fort Scott	.....	.....	.....	50,070	.....	.....	.....	.....	.....	4,700	.....	.....
Hutchinson	.....	.....	.....	15,000c	4,000M	.....	.....	.....	.....	.....	.....	.....
Independence	.....	.....	.....	2.2c	.....	.....	.....	.....	.....	.....	.....	.....
Kansas City	1.91	.....	.....	2.66	.....	2.54	2.35	.....	.....	.38	.....	.....
Lawrence	.....	.....	.....	62,719	.....	.....	.....	.....	.....	.....	.....	.....
Leavenworth	.....	.....	.....	17,037c	.....	.....	.....	.....	.....	.....	.....	.....
McPherson	.....	.....	.....	18,500	.....	.....	.....	.....	.....	.....	.....	.....
Manhattan	.....	.....	.....	12,000c	.....	.....	.....	58,000c	.....	.....	.....	.....
Osowotomie	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
Ottawa	.....	.....	.....	17,331c	.....	999c	.....	.....	27,474c	5,493c	.....	.....
Pittsburgh	.....	.....	.....	12,409c	.....	.....	.....	.....	.....	.....	.....	.....
Rosedale	.....	.....	.....	.....	.....	.....	23,413	.....	.....	.....	.....	.....
Salina	.....	.....	.....	.....	.....	.....	.....	31,385c	.....	.....	.....	.....
Topeka	.....	.....	.....	56,362c	.....	.....	.....	.....	.....	.....	.....	.....
Wichita.*	27,650c	.....	.....	219,596c	637M	70,623c	31,764c	4,383c	.....	.....	.....	.....
Kentucky:												
Catlettsburg	.....	.....	.....	24,000c	.....	.....	.....	.....	.....	.....	.....	.....
Dayton	.....	.....	.....	.....	.....	.....	.....	.....	.....	6,000	.....	2,000
Lexington	35,000c	.....	.....	10,000c	.....	.....	.....	.....	.....	20,000c	.....	.....
Louisville	.....	.....	.....	.....	1,050	.....	.....	.....	.....	.....	.....	.....
Ludlow	.....	.....	.....	12,000c	.....	.....	.....	.....	.....	.....	.....	.....
Owensboro	.....	.....	.....	.....	.....	.....	.....	.....	11,596M	4,444M	.....	.....
Paducah.*	.....	.....	.....	73,416c	.....	.....	.....	42,074c	.....	.....	54.1c	.....
Louisiana:												
Alexandria	.....	.....	.....	.....	.....	.....	5,928	.....	.....	.....	.....	.....
New Orleans	48,807c	.....	.....	.....	10,325c	11,686c	19,452	5,331c	.....	.....	.....	1,891
Shreveport	.....	.....	.....	.....	51,000	.....	12,719	.....	.....	.....	.....	.....
Maine:												
Portland	.....	.....	1,294	.....	.....	16,179	.....	.....	.....	.....	.....	.....
Rockland	.....	.....	6,950c	.....	.....	.....	.....	.....	9,000c	.....	900M	.....
Maryland:												
Annapolis	.....	.....	.....	.....	.....	.....	.....	3,660c	.....	.....	.....	.....
Baltimore	.....	.....	.....	.....	1,835	.....	.....	.....	.....	.....	.....	.....
Cambridge	.....	.....	.....	20,000c	.....	.....	.....	.....	.....	.....	.....	.....
Cumberland	.....	.....	.....	M 10,151c	.....	.....	.....	.....	.....	.....	.....	.....
Westminster	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	M300
Massachusetts:												
Boston	.....	.....	.....	.....	15,000	.....	140	.....	.....	.....	.....	.....
Cambridge	.....	.....	.....	.....	.....	.....	22,784	.....	.....	.....	.....	.....
Everett	.....	.....	7,432	.....	.....	.....	.....	16,600	.....	.....	.....	.....
Greenfield	.....	.....	.....	.....	.....	.....	.....	.....	.....	3,900	13,730	.....
Haverhill	.....	.....	4,891	.....	.....	7,937	.....	.....	37,033	14,893	.....	2,008
Lawrence	10,665c M	.....	.....	.....	.....	.....	.....	.....	.....	8,181	.....	.....
Lowell	.....	.....	22,633M	.....	.....	.....	.....	.....	.....	21,957M	7,000M	M2,000
Lynn	.....	.....	6,593M	.....	.....	21,402c	.....	.....	.....	100,000M	.....	.....
Medford	.....	.....	.....	.....	.....	.....	.....	.....	3,117M	6,917M	.....	.....
New Bedford	.....	.....	.77	.....	.....	.....	2,069c	.....	.....	78,135M	.....	.....
Quincy	.....	.....	.....	.....	1,000	.....	.....	.....	.....	.....	.....	.....
Southbridge	.....	.....	.....	10,000	.....	.....	.....	.....	.....	4,000	.....	.....
Springfield	.....	.....	.....	.....	6,722M	.....	9,886c	.....	.....	70,543M	7,037M	.....
Worcester	.....	.....	42,930	746	.....	14,488	.....	.....	10,334	85,812	9,450	.....
Michigan:												
Albion	.....	.....	.....	.75c	.....	.....	.....	.3M	1c M	.....	.....	.....
Alpena	.....	.....	.....	.....	.....	13,154M	.....	.....	.....	.....	.....	.....
Battle Creek	.....	.....	.....	14,425	.....	.....	.....	.....	.....	.....	.....	.....
Cadillac	.....	.....	.....	.....	.....	.....	.....	.....	.....	17,600M	.....	.....
Cheboygan	.....	.....	.....	.....	.....	.....	.....	.....	4,470c	3,000M	.....	.....
Detroit	17,026c	.....	.....	10,365c	1,849c	.....	.....	.....	.....	.....	.....	.....
Escanaba	.....	.....	.....	.....	.....	12,000c	.....	.....	2,640c	.....	.....	.....
Flint	.....	.....	.....	5,583	.....	.....	.....	.....	.....	.....	.....	.....
Grand Lodge	.....	.....	.....	2,500M	.....	3,000M	.....	.....	.....	.....	.....	.....
Grand Rapids	.....	.....	.....	52,945	.....	1,249	.....	9,807	843	.....	43,531	4,709
Hillsdale	.....	.....	.....	10,940c	.....	.....	.....	.....	.....	.....	.....	.....
Holland	.....	.....	.....	.....	.....	.....	.....	25,000c	.....	.....	.....	.....
Jackson	.....	.....	.....	34,911	.....	8,477	.....	.....	.....	.....	.....	.....
Kalamazoo	.....	.....	.....	15,000	.....	.....	.....	.....	.....	.....	.....	.....
Lansing	.....	.....	.....	.....	.....	10,000M	.....	.....	.....	.....	.....	.....
Monroe	.....	.....	.....	.....	.....	15,000c	.....	.....	.....	.....	.....	.....
Owosso	.....	.....	.....	1,400c	.....	.....	.....	.....	.....	750M	.....	.....
St. Joseph	.....	.....	.....	10,850	.....	.....	.....	.....	.....	.....	.....	.....
Sault Ste. Marie	.....	.....	.....	.....	.....	.....	.....	.....	3,335	.....	.....	.....
Minnesota:												
Albert Lea	.....	.....	.....	.....	27,275	.....	.....	.....	.....	.....	.....	.....
Bemidji	.....	.....	.....	.....	.....	19,826c	.....	.....	.....	.....	.....	.....
Crookston	18,863	.....	2,000c	.....	.....	.....	.....	.....	21,602c	21,180	.....	.....
Mankato	18,526c	.....	.....	49,323c	27,983c	.....	.....	.....	9,537c	14,500M	6M	.....
Minneapolis	.....	.....	15,112M	17,772M	178,000M	.....	.....	.....	29,000M	.....	.....	.....
Rochester	.....	.....	.....	.....	7,444	.....	.....	.....	.....	.....	.....	.....
St. Paul	.....	.....	.....	5,098	.....	.....	.....	.....	.....	.....	.....	.....
Virginia	.....	.....	.....	.....	14,774	.....	32,003	.....	.....	.....	.....	.....
Winona	.....	.....	.....	10,893c	.....	.....	.....	.....	.....	.....	.....	.....
Mississippi:												
Jackson	.....	.....	.....	.....	27,700	.....	34,945	.....	.....	.....	.....	.....
Meridian	.....	.....	.....	.....	.....	.....	4,914	.....	.....	.....	.....	.....
Tupelo	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	17,280

* For footnotes, see page 431.

TABLE No. 1—PAVING DONE DURING 1911 (Continued)

Name of city.	Sheet asphalt.	Asphalt block.	Granite, sandstone or other stone block.	Brick or clay block.	Creosoted wood block.	Concrete.	Bitulithic.	Bituminous Concrete.	Bituminous Macadam.	Plain or water-bound macadam.	Gravel.	Other kinds
Missouri:												
Bethany	.....	.....	.....	.....	.....	2,400c	.....	.....	.....	.....	.....	.....
Brookfield	.....	.....	.....	50,000c	.....	.....	.....	.....	.....	.....	.....	.....
Cape Girardeau	.....	.....	.....	.....	3,100	.....	.....	.....	.....	.....	.....	.....
Carrollton	.....	.....	.....	60,245	.....	.....	.....	.....	.....	.....	.....	.....
Columbia	.....	.....	.....	33,975c	.....	.....	.....	.....	.....	.....	.....	.....
El Dorado Springs	.....	.....	.....	5,000c	.....	.....	.....	.....	.....	.....	.....	.....
Fulton	.....	.....	.....	9,000c	.....	.....	.....	.....	12,500c	.....	.....	.....
Hannibal	.....	.....	.....	51,000	.....	.....	.....	.....	.....	10	2	.....
Joplin	.....	.....	.....	.....	23,000	.....	.....	.....	.....	.....	.....	.....
Kansas City	125,000	.....	23,000	8,000	20,000	81,000	.....	.....	44,700	.....	.....	.....
Kirksville	.....	.....	.....	5,000	.....	2,000	.....	.....	.....	.....	.....	.....
Liberty	.....	.....	.....	3,500c	.....	16,400c	.....	.....	.....	.....	.....	.....
Macon	.....	.....	.....	90,000c	.....	.....	.....	.....	.....	.....	.....	.....
Mexico	.....	.....	.....	320	.....	.....	.....	.....	.....	.....	.....	.....
Moberly	.....	.....	.....	6,000c	.....	.....	.....	.....	.....	.....	.....	.....
St. Charles	.....	.....	.....	.....	.....	.....	.....	.....	2,500	.....	2,000	.....
St. Louis	.....	.....	.....	.....	43,129	.....	73,668	.....	.....	.....	.....	.....
Sedalia	.....	.....	.....	20,000c	.....	.....	.....	.....	.....	.....	.....	.....
Springfield	.....	.....	.....	.....	5,856	.....	.....	.....	.....	.....	.....	.....
Webb City	.....	.....	.....	7,374c	.....	.....	.....	.....	39,058c	.....	.....	.....
Montana:												
Billings	.....	.....	.....	.....	.....	2,000	.....	.....	.....	.....	.....	.....
Bozeman	.....	.....	.....	.....	.....	27,000	.....	.....	.....	.....	.....	.....
Butte	.....	.....	.....	10,224c	.....	.....	.....	.....	.....	7,936M	.....	.....
Great Falls	.....	.....	.....	.....	1,850c	.....	.....	.....	.....	.....	.....	.....
Helena	.....	.....	.....	23,000c	.....	.....	.....	.....	.....	32,000c	.....	.....
Kalispel	.....	.....	.....	.....	.....	.....	8,338	.....	24,150	2	8.6	.....
Missoula	.....	.....	.....	.....	.....	.....	1,600c	.....	.....	12,200c	41,230	.....
Nebraska:												
Chadron	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	11,750	.....
Fremont	.....	.....	.....	8,790c	.....	.....	.....	.....	.....	.....	.....	.....
Lincoln	33,303c	.....	.....	38,319c	.....	752c	572c	.....	.....	1,708c	.....	.....
Omaha	3.61	.....	12,890	3.85	13,500	4,485	.....	.....	32,990M	.....	.....	.....
South Omaha	.....	.....	.....	51,916c	.....	13,201c	.....	42,423c	.....	.....	.....	.....
York	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	.....
New Hampshire:												
Dover	.....	.....	1,600M	.....	.....	.....	2,415	.....	.....	2.25M	3M	M.5
Keene	.....	.....	3,220	.....	.....	.....	.....	.....	3,680	4,100	.....	.....
Laconia	.....	.....	.....	.....	.....	.....	.....	.....	22,000M	.....	.....	.....
New Jersey:												
Atlantic City	.....	.....	.....	.....	.....	.....	22,528	.....	.....	.....	.....	.....
Bayonne	27,600c	.....	.....	12,980c	.....	.....	.....	.....	.....	.....	.....	.....
Bloomfield	.....	.....	.....	.....	.....	.....	.....	.....	.....	477,000	.....	.....
Camden	23,095c	.....	391	4,368c	.....	.....	.....	.....	.....	3,312c	.....	.....
Elizabeth	.....	.....	6,426c	20,820c	.....	.....	.....	4,049c	.....	.....	.....	.....
Harrison	.....	.....	.....	.....	.....	.....	3,061	.....	.....	.....	.....	.....
Hoboken	.....	.....	.....	.....	15,000	.....	.....	.....	.....	.....	.....	.....
Jersey City	6,455c	.....	29,960c	12,174c	.....	.....	.....	.....	9,022c	.....	.....	.....
Kearney	.....	.....	.....	.....	.....	.....	16,988	.....	.....	.....	.....	.....
Montclair	.....	.....	.....	.....	.....	.....	.....	.....	12,520c M	.....	.....	.....
Newark	1,840	4,409	45,104	121,173	.....	.....	113,445	.....	.....	.....	.....	.....
Paterson	.....	.....	.....	.....	15,000	.....	.....	.....	.....	.....	.....	.....
Perth Amboy	.....	.....	.....	.....	.....	.....	11,117	.....	.....	.....	.....	.....
Rutherford	.....	.....	.....	.....	.....	.....	.....	.....	7,350	29,050	.....	.....
Summit	.....	.....	.....	4,500c	.....	.....	.....	.....	2,800c	6,700c M	.....	.....
Westfield	.....	.....	.....	.....	.....	.....	.....	.....	24,500c	45,203c	.....	.....
West Orange	.....	.....	.....	.....	.....	.....	.....	.....	.....	38*	.....	.....
West New York	.....	5,000c	.....	6,300c	.....	.....	.....	.....	.....	.....	.....	.....
New York:												
Albany	.....	.....	1,040	35,495	.....	.....	.....	.....	.....	.....	.....	.....
Binghamton	.....	.....	.....	19,671c	.....	.....	.....	.....	.....	.....	.....	.....
Buffalo	47,386c	.....	1,559c	32,741c	.....	.....	.....	.....	.....	.....	.....	.....
Canajoharie	.....	.....	.....	4,200c	.....	.....	.....	.....	.....	.....	.....	.....
Carthage	.....	.....	.....	.....	.....	.....	.....	.....	1,100	1,100	.....	.....
Cortland	.....	.....	.....	.....	.....	.....	.....	.....	7,500	.....	.....	.....
Dobbs Ferry	.....	1,800	.....	15,000	.....	.....	.....	.....	6	1	2	.....
Dunkirk	20,406	.....	.....	6,760	.....	.....	.....	.....	.....	.....	.....	.....
Elmira	.....	.....	.....	3,145c	.....	.....	.....	.....	.....	.....	.....	.....
Herkimer	.....	.....	.....	3,623c	.....	.....	6,786c	.....	18,593c	.....	.....	.....
Hornell	.....	.....	.....	1,102	.....	.....	.....	.....	1,000	.....	.....	.....
Hudson	.....	.....	.....	14,000c	.....	.....	.....	.....	3,530M	5,000M	.....	.....
Hudson Falls	.....	.....	.....	1,400	.....	.....	.....	.....	.....	.....	.....	.....
Ithaca.*	.....	.....	.75	15	.....	.....	.....	.....	.25	2	2	.....
Jamestown	.....	.....	.....	M52,781c	.....	.....	.....	.....	.....	.....	.....	.....
Kingston	.....	.....	.....	14,465M	.....	.....	.....	.....	8,071M	20,000M	.....	.....
Little Falls	.....	.....	850c	.....	.....	.....	7,300c	.....	2,800c	1,100M	.....	.....
Lockport	.....	.....	.....	.....	2,000	.....	.....	.....	.....	.....	.....	.....
Middletown	.....	.....	.....	M9,000c	.....	.....	.....	.....	.....	2	2	.....
Newark	.....	.....	.....	10,000c	.....	.....	.....	.....	.....	.....	.....	.....
New York City:												
Manhattan	370,285c	54,266c	227,607c	.....	103,580c	.....	.....	.....	.....	.....	.....	.....
Bronx	62,068c	134,178c	41,382c	.....	7,648c	.....	.....	.....	8,938c	3,250c	.....	.....
Brooklyn	393,171c	35,033c	9,059c	.....	.....	.....	.....	.....	.....	693c	.....	.....
Richmond	.....	.....	3,550c	.....	.....	.....	.....	.....	2,352c	.....	.....	5,450c
Niagara Falls	.....	16,584	.....	8,547	.....	18,453	.....	.....	.....	.....	.....	.....
Norwich	.....	.....	.....	14,000c	.....	.....	.....	.....	3,165c	.....	.....	.....
Poughkeepsie	.....	.....	.....	22,500c	2,044c	.....	.....	.....	2,602M	16,998M	.....	.....
Rochester	98,967c	.....	3,300c	125,211c	.....	.....	.....	7,786c	8,300c	.....	.....	.....
Salamanca	.....	.....	.....	2,800M	.....	.....	.....	.....	.....	.....	.....	.....
Schenectady	59,451c	.....	.....	5,126c	.....	.....	.....	.....	8,304c	.....	.....	.....
Syracuse	13,855	.....	2,029	11,370	.....	.....	.....	.....	4,132	.....	.....	.....
Troy	.....	.....	.....	.....	.....	.....	4,364	.....	.....	.....	.....	.....
Utica	16,323	.....	13,016	17,558	.....	.....	3,220	.....	.....	.....	.....	.....
Watertown	.....	.....	.....	3,000c	.....	.....	.....	.....	5,000M	25,000M	.....	.....
White Plains	.....	.....	.....	.....	.....	.....	.....	.....	800c	.....	.....	.....
Whitesboro	.....	.....	.....	.....	.....	.....	7,191	.....	.....	.....	.....	.....
North Carolina:												
Asheville	.....	.....	.....	.....	.....	.....	8,986	.....	.....	.....	.....	.....
Goldsboro	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	M5,000
Greensboro	.....	.....	.....	.....	.....	.....	.....	.....	1,350M	.....	.....	.....
Monroe	.....	.....	.....	.....	.....	.....	.....	.....	20,000M	20,000M	5,000M	.....
North Dakota:												
Fargo	.....	.....	.....	.....	4,654	.....	.....	.....	.....	.....	.....	.....
Grand Forks	.....	.....	.....	.....	.....	37,673	.....	8,187	.....	.....	.....	.....

* For footnotes, see page 431.

TABLE No. 1—PAVING DONE DURING 1911 (Continued)

Name of city.	Sheet asphalt.	Asphalt block.	Granite, sandstone or other stone block.	Brick or clay block.	Creosoted wood block.	Concrete.	Bitulithic.	Bituminous: Concrete.	Bituminous: Macadam.	Plain or water-bound macadam.	Gravel.	Other kinds
Ohio:												
Ashland	.....	.....	.....	9,000c	.....	.....	.....	.....	.....	.....	.....	.....
Cambridge	.....	.....	.....	.5	.....	.....	.....	.....	.....	.....	.....	.....
Canton	.....	.....	.....	110,880c	.....	.....	.....	.....	.....	.....	.....	.....
Chicago Junction	.....	.....	.....	5,400	.....	.....	.....	.....	.....	.....	.....	.....
Chilicothe	.....	.....	.....	5,538c	.....	.....	.....	.....	.....	.5	.....	.....
Cincinnati	35,893	.....	40,218	25,045	.....	.....	3,395	.....	36,480	667,371	.....	153,340
Circleville	.....	.....	.....	70,000c	.....	.....	.....	.....	.....	.....	.....	.....
Cleveland	.....	.....	58,660	324,250	2,671	.....	.....	.....	.....	.....	.....	.....
Columbus	40,490c	.....	4,537c	219,097c	.....	.....	.....	.....	.....	.....	.....	4,267c
Coshocton	5,597c	.....	.....	240c	.....	.....	.....	.....	.....	.....	.....	.....
Dayton	12,510	.....	.....	99,600	.....	3,300	.....	.....	.....	.....	.....	.....
Defiance	.....	8,000	.....	75,000	.....	.....	.....	.....	.....	2	1.5	.....
East Liverpool	.....	.....	.....	2.75c	.....	.....	.....	.....	.....	.....	.....	.....
East Palestine	.....	.....	.....	.75c	.....	.....	.....	.....	.....	.....	.....	.....
Fostoria	.....	.....	.....	21,000c	.....	.....	.....	.....	.....	.....	.....	.....
Galion	.....	.....	.....	22,397c	.....	.....	.....	.....	11,281c	.....	.....	.....
Hamilton	67,678c	.....	.....	.....	.....	.....	.....	.....	4,233c	.....	.....	.....
Lancaster	.....	.....	.....	20,000c	.....	.....	.....	.....	.....	.....	.....	.....
Lima	.....	.....	.....	4,365c	.....	.....	.....	.....	13,872	.....	.....	.....
Lorain	15,400c	.....	.....	4,800c	.....	.....	.....	.....	.....	.....	.....	.....
Marion	6,888c	1,700c	.....	2,428c	2,431c	.....	.....	.....	700c	.....	.....	.....
Massillon	.....	.....	.....	52,000c	.....	.....	.....	.....	.....	.....	26,000c M	.....
Miamisburg.*	.....	.....	.....	5c	.....	.....	.....	.....	.....	1c	12M	.....
Monroeville	.....	.....	.....	8,000	.....	.....	.....	.....	2,800	.....	.....	.....
Mount Vernon	.....	.....	.....	3,000c	.....	.....	.....	.....	.....	.....	.....	.....
Newark	.....	.....	.....	800c	.....	.....	.....	.....	.....	2,000M	.....	.....
Norwalk	.....	.....	.....	6,500	.....	.....	.....	.....	3,000	.....	.....	3,700
Norwood	.....	.....	.....	.....	.....	.....	.....	.....	80,000c	.....	.....	.....
Pomeroy	.....	.....	.....	19,948c	.....	.....	.....	.....	.....	.....	.....	.....
Port Clinton	.....	.....	.....	3,000c	.....	.....	.....	.....	.....	.....	.....	.....
Sandusky	13,000	.....	.....	1,550	.....	.....	.....	.....	.....	.....	.....	.....
Springfield	.755	.....	.....	1.58	.....	.....	.....	.1	.....	.24	.....	.....
Toledo	.....	.....	.....	.....	.....	.....	14,009	.....	.....	.....	.....	.....
Warren	.....	60,000c	50,000c	75,000c	.....	.....	.....	.....	.....	61,480c	.....	.....
Youngstown	3,751c	.....	.....	183,549c	600c	.....	.....	.....	.....	.....	.....	.....
Zanesville	.....	.....	.....	17,500c	.....	.....	.....	.....	.....	.....	.....	.....
Oklahoma:												
Altus	.....	.....	.....	.....	.....	.....	58,200	.....	.....	.....	.....	.....
Bartlesville	.....	.....	.....	23,726	.....	.....	15,678	.....	.....	.....	.....	.....
Chandler	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4c
Chickasha	.....	.....	.....	2,250	.....	.....	.....	.....	.....	.....	.....	.....
Durant	.....	.....	.....	5,638c	.....	.....	.....	.....	9,180c	.....	.....	.....
Mangum	.....	.....	.....	.....	.....	.....	.....	.....	.....	15,840	10,560	.....
Muskogee	200,000	.....	.....	10,000	.....	.....	.....	5,000	12,000	12,000	.....	.....
Oklahoma City	275,668c	.....	.....	8,087	.....	.....	.....	.....	10,783	.....	.....	23,702
Shawnee	24c	.....	.....	4c	.....	.....	.....	.....	.....	.....	.....	.....
Tulsa	12.79c	.....	.....	1.69c	.....	.....	.....	.....	.4c	.....	.....	.....
Oregon:												
Albany	.....	.....	.....	.....	.....	.....	25,000c	.....	.....	.....	.....	.....
Ashland	.....	.....	.....	.....	.....	.....	103,554	.....	.....	.....	.....	.....
Astoria	.....	.....	.....	.....	.....	3,200c	.....	.....	.....	26,500c	.....	15,700c
Baker City	.....	.....	.....	.....	.....	.....	92,024	.....	.....	.....	.....	.....
Corvallis	.....	.....	.....	.....	.....	.....	55,468	.....	.....	.....	.....	.....
Forest Grove	.....	.....	.....	.....	.....	.....	22,141	.....	.....	.....	.....	.....
Grant's Pass	.....	.....	.....	.....	.....	.....	11,000c	.....	.....	5,000c	.....	.....
Hillsboro	.....	.....	.....	.....	.....	.....	15,871	.....	.....	.....	.....	.....
Klamath Falls	.....	.....	.....	.....	.....	.....	71,597	.....	.....	.....	.....	.....
La Grande	.....	.....	.....	.....	.....	.....	40,027	.....	.....	.....	.....	.....
Oregon City	.....	.....	.....	.....	.....	.....	.....	.....	45,000	.....	.....	.....
Portland	384,849c	.....	11,276c	.....	4,397c	449,383c	767,126c	.....	.....	26,233c	.....	1,700c
Salem.*	.....	.....	.....	.....	.....	85,266c	59,612c	.....	.....	14,380c	.....	40,888c
St. John	.....	.....	.....	.....	.....	.....	4,014	.....	.....	.....	.....	.....
The Dalles	.....	.....	.....	.....	.....	.....	44,100c	.....	.....	.....	.....	.....
Twin Falls	.....	.....	.....	.....	.....	.....	31,572	.....	.....	.....	.....	.....
Woodburn	.....	.....	.....	.....	.....	.....	1,854	.....	.....	.....	.....	.....
Pennsylvania:												
Allentown	19,630	.....	.....	983	.....	.....	.....	.....	.....	.....	.....	.....
Altoona	.....	.....	.....	.....	.....	.....	19,872	.....	.....	.....	.....	.....
Bethlehem	.....	.....	.....	.....	.....	.....	.....	3,500	.....	.....	.....	.....
Bloomsburg	.....	.....	.....	1,200M	.....	.....	.....	.....	.....	.....	.....	.....
Carbondale	.....	.....	.....	60,000M	.....	.....	.....	.....	7,500M	.....	.....	.....
Carlisle	.....	.....	.....	1,200M	.....	200M	.....	.....	10,000M	9,600M	.....	.....
Chester	.....	.....	.....	.....	40,000	.....	.....	.....	.....	.....	.....	.....
Du Bois	.....	.....	.....	9,036	.....	.....	.....	.....	.....	.....	.....	.....
East Stroudsburg	.....	.....	2,500c	.....	.....	.....	.....	.....	.....	33,000M	.....	.....
Edwardsville	.....	.....	.....	7,000c	.....	.....	.....	.....	.....	.....	.....	.....
Erie	40,128c	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Franklin	.....	.....	.....	30,000c	.....	.....	.....	.....	.....	.....	.....	.....
Harrisburg	165,676c	.....	.....	2,098c	.....	.....	.....	.....	.....	.....	.....	.....
Hazleton	.....	.....	.....	5,056c	.....	.....	.....	.....	.....	.....	.....	.....
Hollidaysburg	.....	.....	.....	8,000c	.....	.....	12,000c	.....	.....	.....	.....	.....
Indiana	.....	.....	.....	33,000	.....	.....	.....	.....	.....	.....	.....	.....
Kingston	.....	.....	.....	18,500c	1,600c	.....	.....	3,060	.....	.....	.....	.....
Lancaster*.	.....	19,477	30,314	109,201	.....	.....	.....	.....	20,015	748,738	.....	.....
Lansdowne	.....	.....	.....	.....	.....	.....	8,516	.....	.....	.....	.....	.....
McKeesport	.....	.....	1,304c	17,662c	.....	.....	.....	.....	.....	.....	.....	.....
Meadville	.....	.....	.....	6,000c	.....	.....	.....	.....	.....	.....	.....	.....
Mechanicsburg	.....	.....	.....	8,000c	.....	150M	.....	.....	.....	12,000M	.....	.....
Mercer	.....	.....	.....	M 1.75c	.....	.....	.....	.....	.....	.....	.....	.....
Meyersdale	.....	.....	.....	393c	.....	.....	.....	.....	.....	.....	.....	.....
Northumberland	.....	.....	.....	3,102c	.....	.....	.....	.....	.....	.....	.....	.....
Philadelphia	.....	.....	.....	.....	30,000	.....	.....	.....	.....	.....	.....	.....
Pittsburgh	20,398c	394c	54,447c	21,955c	.....	.....	.....	.....	.....	.....	.....	.....
Plymouth	.....	.....	.....	9,000c	.....	.....	.....	.....	.....	.....	.....	.....
Pottstown	.....	.....	.....	931M	.....	.....	.....	.....	.....	2,700M	.....	.....
Punxsutawney	.....	.....	.....	11,632c	.....	.....	.....	.....	.....	.....	.....	.....
Rankin	.....	.....	3,500c	35,000c	.....	.....	.....	.....	.....	.....	.....	.....
Sayre	.....	.....	.....	7,947c	.....	.....	.....	.....	.....	.....	.....	.....
Scranton	59,718c	.....	1,160c	.....	.....	.....	.....	.....	.....	.....	.....	.....
Shamokin	.....	.....	.....	10,000c	.....	.....	.....	.....	.....	.....	.....	.....
South Bethlehem	.....	.....	.....	.....	.....	.....	.....	5,000	.....	.....	.....	.....
Tyrone	.....	.....	.....	6,284	.....	.....	.....	.....	.....	.....	.....	.....
Wilkes-Barre	32,322c	.....	.....	30,996c	.....	.....	.....	.....	.....	.....	.....	.....
Wilkinsburg	.....	.....	810c	11,826c	.....	.....	.....	.....	.....	.....	.....	.....
Williamsport	.....	.....	.....	4,830c	.....	.....	.....	.....	.....	.....	.....	.....
York	6,145c	.....	.....	.....	.....	.....	7,912	.....	.....	.....	.....	.....

* For footnotes, see page 431.

TABLE No. 1—PAVING DONE DURING 1911 (Continued)

Name of city.	Sheet asphalt.	Asphalt block.	Granite, sandstone or other stone block.	Brick or clay block.	Creosoted wood block.	Concrete.	Bitulithic.	Bituminous—Concrete.	Bituminous—Macadam.	Plain or water-bound macadam.	Gravel.	Other kinds.
Rhode Island:												
East Providence	.....	.....	6,450M	.....	.....	.....	.....	.....	.....	14,755M	7,310M	.....
Newport	.....	.....	.....	.....	.....	.....	.....	.....	.....	14,586	.....	.....
Pawtucket	.....	.....	624	393	.....	.....	6,578	.....	.....	8,600	14,500	.....
Providence	209c	.....	10,803M	.....	.....	.....	.....	.....	.....	59,318	.....	.....
Woonsocket	.....	.....	613c	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Carolina:												
Charleston	.....	.....	3,209M	17,127c	.....	.....	.....	.....	.....	.....	.....	.....
Columbia	.....	.....	.....	3,211c	12,686c	.....	16,837c	.....	.....	.....	.....	.....
Greenville	52,398c	.....	.....	35,673M	.....	.....	.....	20,108c	.....	.....	.....	.....
South Dakota:												
Deadwood	.....	.....	.....	.....	.....	.....	.....	.....	.4	.....	.....	.....
Rapid City	.....	.....	.....	.....	.....	.....	.....	.....	42,000	.....	.....	.....
Sioux Falls	.....	.....	.....	.....	765c	.....	.....	.....	.....	.....	.....	.....
Tennessee:												
Knoxville	39,820c	.....	.....	1.4c	(700)M	3,230c	.....	300c	400c	.....	.....	M1,800
Memphis	.....	.....	.....	.....	21,012	.....	.....	.....	.....	.....	.....	.....
Texas:												
Abilene	.....	.....	.....	.....	.....	.....	24,525	.....	.....	.....	.....	.....
Amarillo	.....	.....	.....	.....	2,000	.....	.....	.....	.....	.....	.....	.....
Austin	.....	.....	.....	762	2,453	.....	33,478	.....	.....	.....	3	.....
Beaumont	.....	.....	.....	M150,000c	10,000M	.....	6,500c	.....	.....	.....	.....	M 12
Brownsville	.....	.....	.....	.....	23,000	.....	.....	.....	.....	.....	.....	.....
Dallas	.....	.....	.....	16,651c	57,800c	.....	73,577c	.....	20,746c	.....	.....	.....
El Paso	.....	.....	.....	.....	.....	.....	44,622	.....	.....	.....	.....	.....
Fort Worth	.....	.....	.....	.....	.....	.....	123,726	.....	.....	.....	.....	.....
Greenville	.....	.....	.....	.....	24,000c	3,000c	64,886c	.....	.....	.....	.....	.....
Laredo.*	.....	.....	.....	.....	.....	.....	.....	.....	.....	135,000M	.....	M 378,000
Longview	.....	.....	.....	.....	18,000	.....	.....	.....	.....	.....	.....	.....
Paris	33,000c	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Angelo	.....	.....	.....	.....	23,000c	.....	.....	.....	.....	.....	.....	.....
San Antonio	.....	.....	.....	.....	.....	.....	.....	60,782M	.....	.....	220,000	.....
Wichita Falls	.....	.....	.....	.....	37,800	.....	.....	.....	.....	.....	.....	.....
Utah:												
Salt Lake City	62,767c	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Vermont:												
St Albans	.....	.....	.....	.....	.....	.....	.....	9,000M	.....	6,800M	.....	.....
Virginia:												
Farmville	.....	.....	5,370c	.....	.....	.....	6,710c	.....	4,400c	.....	.....	.....
Fredericksburg	.....	.....	3,000M	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lynchburg	.....	.....	.....	.....	.....	.....	8,522	.....	.....	.....	.....	.....
Newport News	.....	.....	.....	.....	.....	.....	.....	.....	.....	8,300	.....	.....
Norfolk	.....	.....	.....	.....	15,000	.....	.....	.....	.....	.....	.....	.....
Portsmouth	.....	.....	.....	.....	.....	.....	64,000c	.....	.....	.....	.....	.....
Richmond	.....	.....	.....	.....	2,000	.....	.....	.....	.....	.....	.....	.....
Washington:												
Aberdeen	73,384c	.....	.....	.....	.....	1,351c	.....	.....	.....	.....	5,743c	.....
Auburn	.....	.....	.....	.....	.....	.....	20,127	.....	.....	.....	.....	.....
Centralia	.....	.....	.....	.....	.....	.....	14,108	.....	.....	.....	.....	.....
Chehalis	.....	.....	.....	.....	.....	.....	31,708	.....	.....	.....	.....	.....
Colfax	.....	.....	.....	.....	.....	.....	34,228	.....	.....	.....	.....	.....
Dayton	.....	.....	.....	.....	.....	.....	25,000c	.....	.....	.....	.....	.....
Everett	64,565c	.....	.....	4,922c	10,663c	2,897c	.....	.....	.....	.....	.....	.....
Hoquiam	.....	.....	.....	.....	.....	.....	8,965	.....	.....	.....	.....	.....
Kelso	.....	.....	.....	.....	.....	.....	25,939	.....	.....	.....	.....	.....
North Yakima	8,422c	.....	.....	7,793c	.....	.....	46,697	.....	.....	.....	.....	.....
Pasco	.....	.....	.....	.....	.....	.....	58,877	.....	.....	.....	.....	.....
Puyallup	.....	.....	.....	.....	.....	15,520	16,234	.....	28,126	17,663	10,000	.....
Seattle	223,887	.....	44,515	140,754	960	.....	.....	.....	.....	.....	.....	.....
Snohomish	.....	.....	.....	9,856	.....	.....	.....	.....	.....	.....	.....	.....
Spokane	185,555	.....	.....	111,852	.....	93,215	.....	1,369	55,198	.....	.....	.....
Tacoma	16,461c	.....	13,994c	22,018c	.....	13,866c	.....	.....	.....	.....	.....	2.14c
Vancouver	.....	.....	.....	.....	.....	.....	35,590	.....	.....	.....	.....	.....
Walla Walla.*	148,839c	.....	.....	.....	960	.....	64,819c	.....	.....	41,200	.....	.....
West Virginia:												
Follansbee	.....	.....	.....	12,000c	.....	.....	.....	.....	.....	.....	.....	.....
Point Pleasant	.....	.....	.....	2c	.....	.....	.....	.....	.....	.....	1M	.....
Wisconsin:												
Antigo	.....	.....	.....	.....	.....	.....	.....	5,000c	.....	3,000M	.....	.....
Appleton	25,000c	.....	.....	.....	.....	2,500c	.....	.....	.....	.....	2.5M	.....
Burlington	.....	.....	.....	3,200	.....	21,200	.....	.....	.....	6,220c	.....	.....
Chippewa Falls	.....	.....	.....	1,350	.....	.....	.....	.....	.....	.....	4.5	.....
Columbus	.....	.....	.....	7,650c	.....	.....	.....	.....	.....	.....	.....	.....
Fond du Lac	.....	.....	.....	11,043	.....	9,253	.....	.....	.....	.....	.....	.....
Janesville	.....	.....	.....	3,095c	.....	.....	.....	.....	.....	.....	.....	.....
Kenosha	.....	.....	.....	125,000c	.....	.....	.....	.....	8,000c	6,000c	.....	.....
Merrill	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,936M	.....	.....
Madison	.....	.....	.....	.....	2,596	.....	.....	.....	.....	.....	.....	.....
Marinette.*	.....	.....	.....	62,051	(6,000)	.....	.....	.....	.....	244,200	15,800	.....
Neenah	.....	.....	.....	.....	.....	.....	.....	.....	7,143c	.....	.....	.....
Oshkosh	8,523c	.....	.....	5,832c	.....	.....	.....	.....	3,635c	.....	.....	.....
Racine	18,159c	.....	.....	26,817c	.....	.....	2,299c	.....	.....	.....	.....	.....
Superior	27,000c	.....	.....	10,500c	3,500c	3,000c	.....	.....	.....	11,000c	.....	.....
Wausau	.....	.....	.....	.....	7,200	.....	.....	.....	.....	.....	.....	.....
Waukesha	.....	.....	.....	.....	.....	.....	.....	.....	4,619c	.....	.....	.....
Wyoming:												
Sheridan	.....	.....	.....	.....	3c	.....	.....	.....	.....	.....	.....	.....

* Figures probably include all paving to date.
† Includes brick also.
‡ Includes concrete, bitulithic and bituminous macadam.
NOTE.—The two or three instances of figures in parentheses under "Creosoted wood block" column are for untreated wood block.
The letter c means that the pavement was laid by contract; M, that it was laid by the municipality. Where there is no letter, this information was not given. Quantities are either square yards or miles; the size of the number will indicate which is intended in each case.

TABLE No. 2.

PAVEMENT REPAIRS MADE IN 1911.

Name of city.	Sheet asphalt.	Asphalt block.	Granite, sandstone or other stone block.	Brick or clay block.	Creosoted wood block.	Concrete.	Bitulithic.	Bituminous: Concrete.	Bituminous: Macadam.	Plain or water-bound macadam.	Gravel.	Other kinds
Arkansas:												
Fayetteville	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	10,000	.....
California:												
Berkeley	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Grass Valley	.....	.....	.....	.....	.....	.....	.....	150c	.....	3,000M	.....	.....
San Jose	3,680M	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Stockton	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,000M	.....	.....
Colorado:												
Boulder	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	10,000	.....
Connecticut:												
East Hartford	.....	.....	.....	.....	.....	.....	.....	.....	.....	16,000	.....	.....
Norwich	.....	.....	850	200	.....	.....	.....	.....	.....	5,000	25,000	.....
Dist. of Columbia:												
Washington	69,680 cu.ft.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Illinois:												
Alton	.....	.....	.....	1,085	.....	.....	.....	.....	.....	.....	.....	.....
Bloomington	1,205	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Highland Park	.....	.....	.....	.....	.....	.....	.....	.....	.....	12,000	.....	.....
Oak Park	509c	.....	.....	.....	.....	.....	.....	.....	.....	13,000M	.....	.....
Rockford	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Streator	.....	.....	.....	500c	.....	.....	.....	.....	.....	.....	100M	.....
Indiana:												
Greencastle	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,000M	.....	.....
Muncie	500M	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wabash	343	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Washington	.....	.....	.....	.....	.....	.....	.....	.....	.....	3,000M	5,000M	.....
Iowa:												
Dubuque	.....	.....	.....	1,000	.....	.....	.....	.....	.....	.....	.....	.....
Kansas:												
Topeka	.....	.....	.....	1,241c	.....	.....	.....	.....	.....	.....	.....	.....
Kentucky:												
Lexington	.....	.....	.....	100c	.....	.....	.....	.....	.....	.....	.....	.....
Louisiana:												
Alexandria	709c	.....	.....	.....	.....	.....	.....	.....	.....	.....	500M	.....
Maine:												
Portland	.....	.....	.....	.....	.....	.....	239	549	1,434	.....	.....	.....
Maryland:												
Westminster	.....	.....	.....	.....	.....	.....	.....	.....	450M	.....	.....	.....
Massachusetts:												
Lowell	1,492c	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
New Bedford	.....	.....	.....	.....	.....	.....	4,000	.....	.....	.....	.....	.....
Springfield	635c	.....	.....	.....	.....	.....	6,835c	.....	.....	.....	.....	.....
Minnesota:												
Mankato	200	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Paul	3,589	.....	691	105	.....	.....	.....	.....	.....	.....	.....	.....
Winona	.....	.....	.....	32	.....	.....	.....	.....	.....	.....	.....	.....
Missouri:												
Hannibal	.....	.....	.....	700	.....	.....	.....	.....	.....	1,000	.....	.....
Kansas City	70,000M	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Kirksville	.....	.....	.....	.....	.....	.....	340	.....	.....	.....	.....	.....
Lexington	.....	.....	.....	.....	.....	300	.....	.....	.....	200	.....	.....
St. Charles	.....	.....	.....	1,000	.....	.....	.....	.....	.....	.....	.....	.....
Montana:												
Bozeman	.....	.....	.....	.....	.....	50	.....	.....	.....	.....	.....	.....
Nebraska:												
Lincoln	1,474	.....	.....	4,764	.....	.....	.....	.....	.....	.....	.....	.....
New Jersey:												
Bloomfield	.....	.....	.....	.....	.....	.....	.....	.....	.....	26,000	.....	.....
Montclair	.....	.....	.....	.....	.....	.....	.....	.....	76,600c M	.....	.....	.....
Newark	21,500	.....	34,402	.....	.....	.....	12,500	.....	.....	.....	.....	.....
Omaha	30,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rutherford	.....	.....	.....	.....	.....	.....	.....	.....	.....	35,900	.....	.....
Summit	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,000	.....	.....
New York:												
New York City:												
Bronx	9,489c	1,492c	52,645M	.....	275M	.....	.....	.....	13	359,071	.....	.....
Brooklyn	155,347M	2,875M	335,717M	1,162M	1,663M	.....	.....	.....	.....	M128,576	1,671,940M	.....
Manhattan	434,200c	43,734c	314,598M	.....	.....	.....	.....	.....	.....	.....	.....	.....
Richmond	.....	1,026M	39M	185M	9M	.....	.....	.....	3,275M	45,985M	.....	.....
Buffalo	161,144	.....	2,405	3,050	.....	.....	.....	.....	.....	.....	.....	38,262
Cortland	1,000	.....	.....	.....	.....	800	.....	.....	.....	.....	.....	.....
Fulton	.....	.....	.....	.....	.....	.....	.....	.....	1,000	.....	.....	.....
Hudson	.....	9,000M	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Niagara Falls	2,573	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Norwich	.....	.....	.....	100c	.....	.....	.....	.....	.....	.....	.....	.....
Ogdensburg	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,000	.....	.....
Salamanca	.....	.....	.....	500M	.....	.....	.....	.....	.....	.....	.....	.....
Schenectady	15,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Syracuse	32,444	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Utica	5,400	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North Carolina:												
Monroe	.....	.....	.....	.....	.....	.....	.....	.....	.....	5,000	.....	.....
Ohio:												
Columbus	10,218	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	39,863
Coshocton	450c	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Newark	.....	.....	.....	2,000M	.....	.....	.....	.....	.....	.....	.....	.....
Pomeroy	.....	.....	.....	1,500c	.....	.....	.....	.....	.....	.....	.....	.....
Springfield	110	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Warren	.....	500c	.....	.....	.....	.....	.....	.....	.....	15,000c	.....	.....
Oklahoma:												
Durant	.....	.....	.....	.....	.....	.....	.....	.....	10	.....	.....	.....
Muskogee	2,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pennsylvania:												
Bloomsburg	.....	.....	.....	.....	.....	.....	.....	.....	1,600	.....	.....	.....
Carbondale	.....	.....	.....	10,000M	.....	.....	.....	.....	.....	.....	.....	.....
Erie	9,135M	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Franklin	.....	.....	.....	500M	.....	.....	.....	.....	.....	.....	.....	.....
Hazleton	.....	.....	.....	902	.....	.....	.....	.....	.....	.....	.....	.....
Kingston	.....	.....	.....	4,000c	.....	.....	.....	.....	.....	.....	.....	.....
Nazareth	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,000	.....	.....
Rankin	.....	.....	.....	3,000M	.....	.....	.....	.....	.....	.....	.....	.....
Scranton	18,772	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wilkinsburg	.....	.....	.....	1,000M	.....	.....	.....	.....	.....	.....	.....	.....
York	4,000c	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

TABLE No. 2—PAVEMENT REPAIRS MADE IN 1911 (Continued)

Name of city.	Sheet asphalt.	Asphalt block.	Granite, sandstone or other stone block.	Brick or clay block.	Creo-soted wood block.	Concrete.	Bit-ulithic.	Bituminous—Concrete.	Bituminous—Mac-adam.	Plain or water-bound macadam.	Gravel.	Other kinds
Rhode Island:												
Newport	.....	.....	.....	.....	.....	.....	.....	.....	.....	33,318	.....	.....
Pawtucket	.....	.....	.....	.....	.....	.....	5,125	.....	.....	.....	.....	.....
Tennessee:												
Knoxville	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Texas:												
Austin	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	34,600	.....
Laredo	.....	.....	.....	.....	.....	.....	.....	.....	.....	5,000	2,500	.....
San Antonio	.....	.....	.....	.....	.....	.....	.....	4,200	.....	.....	.....	.....
Utah:												
Salt Lake City	7,650c	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Virginia:												
Newport News	3,000c	.....	.....	.....	.....	.....	2,500c	.....	.....	.....	.....	.....
Portsmouth	403c	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Suffolk	.....	.....	.....	.....	.....	.....	200	.....	.....	.....	.....	.....
Washington:												
Spokane	7,009	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

TABLE No. 3.

RECONSTRUCTION ON RESURFACING DURING 1911.

Name of city.	Sheet asphalt.	Asphalt block.	Granite, sandstone or other stone block.	Brick or clay block.	Creo-soted wood block.	Concrete.	Bit-ulithic.	Bituminous—Concrete.	Bituminous—Mac-adam.	Plain or water-bound macadam.	Gravel.	Other kinds
California:												
Berkeley	11,100c[1]	.....	.....	.....	.....	.....	.....	.....	.....	10,000c[1]	.....	.....
Fresno	770c[2]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Rafael	.....	.....	.....	.....	.....	.....	.....	.....	.....	100,000	.....	.....
Connecticut:												
Hartford	16,335[2]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Norwich	.....	.....	.....	.....	.....	.....	.....	.....	.....	8,000[3]	.....	.....
Southampton	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,500[4]	.....	.....
Dist. of Columbia:												
Washington	116,157[5]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Florida:												
St. Petersburg	.....	.....	.....	10.75c	.....	.....	.....	.....	.....	.....	.....	.....
Illinois:												
Waukegan	.....	.....	.....	.....	.....	.....	.....	.....	23,000c	.....	.....	.....
Indiana:												
Greencastle	.....	.....	.....	.....	.....	.....	.....	.....	.....	50,000M	.....	.....
Logansport	4,513[2]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Muncie	.....	.....	.....	.....	.....	289M[2]	.....	.....	.....	.....	.....	.....
Iowa:												
Marshalltown	.....	.....	.....	.....	.....	7,000c[6]	.....	.....	.....	.....	.....	.....
Waterloo	7,400c[6]	.....	.....	.....	1,800c[6]	.....	.....	.....	.....	.....	.....	.....
Kansas:												
Hutchinson	.....	.....	.....	30,000c[7]	.....	.....	.....	.....	.....	.....	.....	.....
Lawrence	.....	.....	.....	2,000c[1]	.....	.....	.....	.....	.....	.....	.....	.....
Leavenworth	.....	.....	.....	.....	.....	.....	.....	19,234c[2]	.....	.....	.....	.....
Topeka	.....	.....	13,426c[8]	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wichita	23,890[2]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Kentucky:												
Dayton	.....	.....	.....	.....	.....	.....	.....	.....	.....	18,000	.....	.....
Maine:												
Portland	.....	.....	.....	.....	.....	.....	.....	20,000	.....	.....	.....	.....
Maryland:												
Westminster	.....	.....	.....	.....	.....	.....	.....	.....	11,736M[1]	.....	.....	.....
Massachusetts:												
Everett	.....	.....	2,370[7]	.....	.....	.....	.....	.....	.....	.....	.....	.....
Greenfield	.....	.....	.....	.....	.....	.....	.....	.....	37,420	11,400	.....	.....
New Bedford	.....	.....	18,271c[9]	.....	.....	.....	28,008[10]	.....	.....	78,799[1]	.....	.....
Springfield	.....	.....	.....	.....	.....	.....	.....	.....	.....	16,792M	10,248	.....
Woburn	.....	.....	.....	.....	.....	.....	.....	.....	.....	15,144[3]	.....	.....
Worcester	.....	.....	.....	.....	.....	.....	.....	.....	.....	25,400[1]	64,064[3]	.....
Michigan:												
Detroit	186,016M[11]	.....	24,674M[6]	149,200M[1]	37,902M[12]	3,248M[12]	.....	.....	.....	.....	.....	.....
St. Joseph	.....	.....	.....	2,900[2]	.....	.....	.....	.....	.....	.....	.....	.....
Minnesota:												
Winona	.....	.....	.....	.....	.....	.....	.....	.....	.....	280M	.....	.....
Missouri:												
Brookfield	.....	.....	.....	M 1,000c	.....	.....	.....	.....	.....	.....	.....	.....
Nebraska:												
Lincoln	.....	.....	.....	7,820[6]	.....	.....	.....	.....	.....	.....	.....	.....
Omaha	1.12	.....	.....	1.54	.....	.....	.....	.....	.....	.....	.....	.....
New Jersey:												
Bloomfield	.....	.....	.....	.....	.....	.....	.....	.....	.....	30,000	.....	.....
Jersey City	4,480M[8]	.....	.....	4,998M[8]	3,440M[8]	.....	.....	.....	.....	.....	.....	.....
Montclair	.....	.....	.....	.....	.....	.....	.....	.....	.....	66,000M	.....	.....
Newark	17,812[2]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Phillipsburg	.....	.....	.....	4,400[6]	.....	.....	.....	.....	.....	2,114[3]	.....	8,000
Rutherford	.....	.....	.....	.....	.....	.....	.....	.....	.....	79,500[1]	.....	.....
Summit	.....	.....	.....	.....	.....	.....	.....	.....	.....	48,000M[1]	.....	.....
Westfield	.....	.....	.....	.....	.....	.....	.....	.....	2,836c[1]	17,354c[1]	.....	.....
New York:												
Albany	.....	.....	2,683[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buffalo	32,081[2]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dobbs Ferry	.....	.....	.....	1,800	.....	.....	.....	.....	.....	.....	.....	.....
Hornell	.....	.....	.....	.....	.....	.....	.....	.....	1,428[1]	.....	.....	.....
Ithaca	.....	.....	.....	.....	.....	.....	.....	.....	.....	6,000	.....	.....
Middletown	.....	.....	.....	.....	.....	.....	.....	.....	10,000[1]	.....	.....	.....
New York City:												
Bronx	.....	.....	.....	.....	.....	.....	.....	.....	.....	234,185[1]	.....	.....
Brooklyn	359,462[20]	32,168c[20]	99,321c[20]	.....	15,399c[21]	.....	.....	.....	.....	.....	.....	c[8]16,863
Richmond	.....	.....	10,950c[1]	61,728c[1]	24,514c[1]	720c[1]	.....	46,000c[1]	89,603M[1]	.....	.....	.....
Niagara Falls	.....	447[2]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Norwich	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,000M	.....
Ogdensburg	.....	.....	.....	.....	.....	.....	.....	.....	10,000	.....	.....	.....
Rochester	58,048[13]	.....	19,189[13]	9,316[24]	1,310[8]	.....	.....	.....	.....	.....	.....	.....
Schenectady	9,755[15]	.....	2,339[8]	6,021[15]	.....	.....	.....	.....	.....	.....	.....	.....
Syracuse	10,118[2]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Utica	3,448[2]	.....	.....	.....	.....	.....	7,640[2]	.....	.....	.....	.....	.....
White Plains	.....	.....	.....	.....	.....	.....	.....	.....	10,000M[1]	.....	.....	.....

TABLE No. 3—RECONSTRUCTION OR RESURFACING DURING 1911 (Continued)

Name of city.	Sheet asphalt.	Asphalt block.	Granite, sandstone or other stone block.	Brick or clay block.	Creosoted wood block.	Concrete.	Bitulithic.	Bituminous: Concrete.	Bituminous: Macadam.	Plain or water-bound macadam.	Gravel.	Other kinds.
Ohio:												
Ashland	.....	.....	.....	.....	.....	.....	.....	.....	7,400c[1]	2,640c[1]	.....	.....
Cleveland	9,886[2]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mount Vernon	.....	.....	.....	1,650c[16]	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown	12,081c[2]	.....	.....	16,116c[16]	5,500c[2]	.....	.....	.....	.....	.....	.....	.....
Oregon:												
Astoria	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,400	.....	.....
Portland	159,222[22]	.....	54,102[10]	.....	.....	69,349[23]	168,323[10]	.....	.....	.....	.....	.....
Pennsylvania:												
Allentown	.....	.....	.....	.....	.....	.....	.....	.....	15,415[1]	.....	.....	.....
Carlisle	.....	.....	.....	.....	.....	.....	.....	.....	14,000M	.....	.....	.....
Easton	.....	.....	.....	2,900c[6]	.....	.....	.....	3,700c[1]	.....	18,855M[1]	.....	.....
Hazleton	.....	.....	.....	.....	.....	.....	3,500	.....	.....	.....	.....	.....
Pittsburgh	9,397c[17]	.....	16,327c[18]	8,050c[19]	5,323c[8]	.....	.....	.....	.....	.....	.....	.....
Pottstown	.....	.....	.....	.....	.....	.....	.....	.....	.....	40,000M	.....	.....
Scranton	.....	.....	3,425	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wilkes-Barre	3,500[6]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wilkinsburg	.....	.....	.....	1,700M[16]	.....	.....	.....	.....	.....	.....	.....	.....
Rhode Island:												
East Providence	.....	.....	.....	.....	.....	.....	.....	.....	.....	12,777M[1]	51,585M[3]	.....
Pawtucket	.....	.....	.....	.....	.....	.....	574	.....	.....	.....	.....	.....
Providence	1,063c[2]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tennessee:												
Knoxville	.....	.....	.....	.....	.....	.....	5,000c[7]	.....	.....	10,078	.....	.....
Texas:												
San Antonio	.....	.....	.....	.....	.....	.....	.....	39,675[2]	.....	.....	.....	.....
Vermont:												
St. Albans	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,995M[1]	.....	.....
Washington:												
Aberdeen	200[2]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Spokane	2,435[2]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wisconsin:												
Burlington	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,200c	.....

NOTE.—The letter c indicates work done by contract; M, by the municipality. All quantities are square yards, except in the case of Omaha.
[1] Replaces macadam. [2] Replaces sheet asphalt. [3] Replaces gravel. [4] Replaces cinders. [5] Replaces coal tar and other bituminous pavements. [6] Replaces brick. [7] Replaces bitulithic. [8] Replaces stone block. [9] Replaces asphalt block, cobble and macadam. [10] Replaces granite block and macadam. [11] Replaces asphalt or cedar block. [12] Replaces cedar block. [13] Replaces stone block, asphalt, macadam and gravel. [14] Replaces brick and stone block. [15] Replaces asphalt, asphalt block and stone block. [16] Replaces asphalt block. [17] Replaces cobble and stone block. [18] Replaces cobble and asphalt. [19] Replaces cobble stone. [20] Replaces asphalt, granite, Belgian, cobble and macadam. [21] Replaces asphalt, brick and iron slag. [22] Replaces macadam and asphalt. [23] Replaces macadam and gravel.

(Continued from page 426.)

repaired during the year 1911. In some cases it might be difficult to decide whether a certain piece of work was repair work or reconstruction, but decision on this point was left to the individual engineers. It should also be added that there was a large amount of asphalt repairing and a smaller amount of repair of other kinds of pavements, which were done by the contractors under their guarantee, and were not included in the reports. Excluding these, we find gravel roads leading, with 1,749,000 square yards repaired; asphalt second, with 1,050,000 square yards; stone block, with 689,000 square yards; macadam, 361,000 square yards; bituminous macadam, 84,000 square yards; asphalt block, 57,000 square yards; brick, 39,000 square yards; bitulithic, 24,000 square yards; bituminous concrete, 5,000 square yards; wood block, 2,000 square yards; concrete, 1,000 square yards.

In Table No. 3 it is stated in many instances what kind of pavement was replaced in repaving or resurfacing Eliminating those in which the same material was used for such repaving, we find, as might be expected, that macadam was replaced to the greatest extent, viz., 674,000 square yards, or 47¼ per cent. of the total amount; in addition to about one-quarter as much which was replaced by bituminous macadam. Stone block came next, with 136,000 square yards, replaced by other pavement, 134,000 of cedar block, 116,000 square yards of bituminous concrete, 116,000 of sheet asphalt, 54,000 of brick, 32,000 of asphalt block, 2,000 of bitulithic. No wood block or concrete was reported as being replaced by other material, possibly especially in the case of concrete, because none has yet worn out over any considerable area. The materials used for resurfacing and reconstruction were as follows: Asphalt, 1,070,000 square yards; macadam, 622,000; brick, 339,000; stone block, 267,000; bituminous macadam, 233,000; bitulthic, 213,000; bituminous concrete, 129,000; gravel, 119,000; wood block, 95,000; concrete, 80,000; asphalt block, 33,000, and miscellaneous pavements, 25,000. In a number of cases, notably those of gravel and macadam, the new pavement replaced another of the same kind.

SIDEWALKS, CURBS AND GUTTERS

AN inspection of the data received concerning the construction of sidewalks, curbs and gutters indicates a most decisive preponderance of concrete over all other substances for each of these. In the case of sidewalks, of 428 replies, 336 stated that the sidewalks constructed last year were composed of cement, concrete, granolithic or granitoid—variations more in name than in construction, as we understand the use of the terms. Next in order came flagstone, bluestone, sandstone or simply "stone," all designated under these various heads totaling 37. Twenty-two cities reported brick sidewalks, 15 tar concrete, 10 gravel or broken stone, 4 concrete blocks or tile, 3 plank and one asphalt. This shows concrete and its variations to comprise 78½ per cent. No attempt was made to compare the total amounts constructed, but we do not believe that such a comparison would show a less pronounced lead of concrete in sidewalk work.

In the construction of curbs concrete leads also, 70½ per cent. of the replies giving this as the materials used. Granite comes next with 12½ per cent.; then sandstone, 4½ per cent.; then bluestone, 4 per cent., and limestone, ¾ of one per cent.; while 7¼ per cent. were of stone, but the kinds not specified. In two instances brick was reported as being used for curbs and in one instance wood.

Of the gutters reported 73¾ per cent. were of concrete, 10¼ per cent. of cobble, brick and granite each showed 4½ per cent., bluestone 2¼ per cent., limestone one per cent., "stone" (kind not stated) 3 per cent. and plank was used in one instance. A considerable proportion of those reporting concrete gutters used the combined concrete curb and gutter construction.

In the payment for the sidewalks, curbs and gutters there was much greater diversity. In 325 cities sidewalks are paid for by the owner, in 12 cities by the city and in 59 cities both pay in varying proportions. In 7 cases no details were given as to the distribution of the cost. In 22 cases the city and owner each pay one-half. In 17 cases the city pays for the corners at street intersections, the

(Continued on page 444.)

TABLE No. 4.

ESTIMATE OF PAVEMENT TO BE LAID IN 1912.

Name of city.	Sheet asphalt.	Asphalt block.	Granite, sandstone or other stone block.	Brick or clay block.	Creosoted wood block.	Concrete.	Bitulithic.	Bituminous: Concrete.	Bituminous: Macadam.	Plain or water-bound macadam.	Gravel.	Other kinds
Alabama:												
Gadsden	.....	.....	.....	.....	.....	.....	.....	.....	20,000c	3M	.....	.....
Huntsville	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
California:												
Berkeley	169,000c	.....	.....	.....	.....	.....	121,500	74,800	.....	40,000	.....	.....
Chico	45,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fresno	.....	.....	.....	.....	.....	.....	.....	20,000c	.....	.....	.....	31.67*
Los Angeles	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Marysville	37,110c	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Modesto	100,000c	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sacramento	51,620c	.....	.....	.....	.....	.....	.....	16,000	175,000	.....	.....	.....
San Bernardino	.5	.....	.....	.....	.....	.....	.....	.....	4	.....	6	.....
San Rafael	.....	.....	.....	.....	.....	.....	.....	41,000	.....	.....	.....	.....
Santa Barbara	2c	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Stockton	1,260c	.....	.....	.....	.....	8,000c	.....	50,000c	82,300c	.....	.....	.....
San Jose	88,426	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Santa Cruz	.....	.....	.....	.....	.....	.....	.....	.....	23,466	.....	.....	.....
Colorado:												
Boulder	.....	.....	.....	.....	.....	8,500c	.....	.....	.....	.....	.....	.....
Florence	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.5*
Grand Junction	.....	.....	.....	.....	.....	25,000M	.....	.....	.....	.....	.....	.....
Connecticut:												
Ansonia	.....	.....	500	.....	.....	.....	1,450	.....	.....	.....	.....	.....
East Hartford	.....	.....	.....	.....	.....	.....	.....	.....	.....	8,000	.....	.....
Greenwich	.....	.....	.....	.....	1,700c	.....	17,000	.....	.....	.....	.....	.....
Hartford	8,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Norwich	.....	.....	.....	3,000	.....	.....	.....	.....	.....	6,300	10	.....
Torrington	.....	.....	133	.....	.....	.....	.....	.....	6,453	.....	.....	8,213
Wallingford	.....	.....	.....	5,000	5,000	.....	.....	10,000	5,000	15,000	.....	.....
Delaware:												
Milford	.....	.....	.....	.....	.....	2,000	.....	.....	.....	.....	.....	.....
Wilmington	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	175.000*
Dist. of Columbia:												
Washington	17,000c	12,000c	.....	.....	.....	.....	.....	.....	25,000	25,000	.....	.....
Georgia:												
Albany	.....	.....	.....	.....	.....	.....	.....	20,000	.....	.....	.....	.....
Columbus	.....	.....	.....	15,000c	.....	.....	.....	.....	7,550M	.....	.....	.....
Florida:												
Gainesville	.....	.....	.....	50,000	.....	.....	.....	.....	.....	.....	.....	.....
Pensacola	.....	.....	.....	75,000c	70,000c	35,000c	.....	.....	.....	.....	.....	.....
Palatka	.....	.....	.....	10,000c	.....	.....	.....	.....	.....	.....	20,500	.....
St. Petersburg	.....	.....	.....	5	.....	.....	.....	.....	.....	.....	.....	1
Georgia:												
Waycross	.....	.....	.....	4,000	.....	.....	.....	.....	.....	.....	.....	.....
Idaho:												
Pocatello	.....	.....	.....	.....	.....	.....	32,000	.....	.....	.....	.....	.....
Illinois:												
Alton	.....	.....	.....	64,000	.....	.....	.....	.....	.....	.....	.....	.....
Carlinville	.....	.....	.....	1,200c	.....	3,800c	.....	.....	.....	.....	.....	.....
Chicago	950,000c	.....	135,000c	470,000c	240,000c	10,000c	.....	25,000c	15,000c	250,000c	.....	.....
Danville	.....	.....	.....	50,000	.....	.....	.....	.....	.....	.....	.....	.....
Galva	.....	.....	.....	9,000	.....	.....	.....	.....	.....	.....	.....	.....
Greenville	.....	.....	.....	.....	.....	7,800c	.....	.....	.....	.....	.....	.....
Harrisburg	.....	.....	.....	16,600c	.....	.....	.....	.....	.....	.....	.....	.....
Highland Park	.....	.....	.....	.....	.....	23,000	.....	.....	.....	.....	.....	.....
Hillsboro	.....	.....	.....	20,000c	.....	.....	.....	.....	.....	.....	.....	.....
Jerseyville	.....	.....	.....	30,000	.....	.....	.....	.....	.....	.....	.....	.....
Lake Forest	.....	.....	.....	.....	.....	.....	.....	15,000c	.....	.....	.....	.....
Marion	.....	.....	.....	.....	.....	.....	.....	.....	10,600	.....	.....	.....
Marshall	.....	.....	.....	13,125	.....	.....	.....	.....	.....	.....	.....	.....
Mattoon	.....	.....	.....	60,000	.....	.....	.....	.....	.....	.....	.....	.....
Moline	31,000	.....	.....	42,000	.....	.....	.....	.....	.....	.....	.....	.....
Monmouth	.....	.....	.....	20,400	.....	.....	.....	.....	.....	.....	.....	.....
Normal	.....	.....	.....	17,000c	.....	.....	.....	.....	.....	.....	.....	.....
Oak Park	.....	.....	.....	31,224c	.....	.....	.....	85,625c	.....	6,540c	.....	.....
Paris	.....	.....	.....	14,000c	.....	.....	.....	.....	.....	.....	.....	.....
Pekin	.....	.....	.....	200,000c	.....	.....	.....	.....	.....	.....	.....	.....
Pontiac	.....	.....	.....	10,000	(4,500)	.....	.....	.....	6,500	.....	.....	.....
Rockford	.....	.....	.....	46,283	.....	.....	.....	.....	.....	.....	.....	.....
Rock Island	25,000	.....	.....	16,000	.....	.....	.....	.....	.....	.....	.....	.....
Springfield	15,000c	.....	.....	65,000c	.....	1,000c	.....	.....	.....	.....	.....	.....
Streator	.....	.....	.....	23,000c	.....	.....	.....	.....	.....	.....	.....	.....
Waukegan	.....	.....	.....	17,500c	.....	.....	.....	6,400c	8,000c	.....	.....	.....
Wheaton	.....	.....	.....	.....	.....	.....	.....	.....	23,104c	.....	.....	.....
Indiana:												
Attica	.....	.....	.....	13,000	.....	.....	.....	.....	.....	.....	.....	.....
Bedford	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Bloomington	.....	.....	.....	25,000c	.....	.....	.....	.....	.....	5,000c	.....	.....
Fort Wayne	35,000	.....	.....	52,000	.....	.....	.....	.....	.....	.....	.....	.....
Huntington	14,000c	.....	.....	.....	.....	6,000c	.....	.....	.....	.....	.....	.....
Kokomo	11,200	.....	.....	26,920	.....	.....	.....	8,800	.....	.....	.....	.....
Logansport	.....	.....	.....	20,000	.....	.....	.....	.....	.....	.....	20,000	.....
Mishawaka	2,244c	.....	.....	17,629c	.....	.....	21,140c	.....	.....	.....	.....	.....
Muncie	.....	.....	.....	15,000c	.....	.....	.....	.....	.....	.....	.....	.....
Portland	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	10,000
Richmond	.....	.....	.....	12,000c	.....	.....	.....	.....	.....	.....	.....	.....
Shelbyville	.....	.....	.....	31,680	.....	.....	.....	.....	.....	.....	.....	.....
South Bend	7,610c	.....	.....	58,313c	.....	.....	.....	.....	.....	.....	.....	.....
Wabash	7,000c	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
West Lafayette	.....	.....	.....	.....	.....	.....	.....	.....	10,000	.....	.....	.....
Iowa:												
Creston	.....	.....	.....	.....	.....	.....	.....	50,000	.....	.....	.....	.....
Fort Dodge	.....	.....	.....	.....	.....	15,000c	.....	.....	.....	.....	.....	.....
Independence	.....	.....	.....	2,400c	.....	.....	.....	.....	.....	.....	.....	.....
Iowa Falls	.....	.....	.....	.....	.....	35,000c	.....	.....	.....	.....	.....	.....
Lake City	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,000M	.....
Marshalltown	.....	.....	.....	.....	.....	3.5c	.....	.....	.....	.....	.....	.....
Mason City	.....	.....	.....	.....	.....	50,000	.....	.....	.....	.....	.....	.....
Muscatine	.....	.....	.....	9,970c	.....	3,333c	22,290c	.....	.....	.....	.....	.....
Oelwein	.....	.....	.....	.....	.....	14,000	30,000	.....	.....	.....	.....	.....
Ottumwa	.....	.....	.....	30,000	2,800	.....	.....	.....	.....	.....	.....	.....
Sioux City	.....	.....	.....	.....	.....	175,000c	.....	.....	.....	.....	.....	.....
Waterloo	50,000c	.....	.....	9,000	.....	.....	.....	.....	.....	.....	.....	.....

(For footnotes, see page 438.)

TABLE No. 4—ESTIMATE OF PAVEMENT TO BE LAID IN 1912 (Continued)

Name of city.	Sheet asphalt.	Asphalt block.	Granite, sandstone or other stone block.	Brick or clay block.	Creosoted wood block.	Concrete.	Bitulithic.	Bituminous—Concrete.	Bituminous—Macadam.	Plain or water-bound macadam.	Gravel.	Other kinds
Kansas:												
Atchison	.....	.....	.....	3,000c	.....	10,000c	.....	.....	.....	.....	.....	.....
Coffeyville	.....	.....	.....	73,201c	.....	.....	.....	.....	.....	.....	.....	.....
El Dorado	.....	.....	.....	.....	.....	.1	.....	.....	.....	800	.....	.....
Fort Scott	.....	.....	.....	50,000	.....	.....	.....	.....	.....	28,170	.....	.....
Great Bend	.....	.....	.....	25,000	.....	10,000	.....	.....	.....	.....	150,000	.....
Independence	.....	.....	.....	1c	.....	.....	.....	.....	.....	.....	.....	.....
Lawrence	.....	.....	.....	20,000c	.....	.....	.....	.....	.....	.....	.....	.....
Leavenworth	.....	.....	.....	35,200c	.....	.....	.....	.....	.....	.....	.....	.....
Manhattan	.....	.....	.....	12,000c	.....	.....	.....	40,000c	.....	.....	.....	.....
Pittsburgh	.....	.....	.....	17,500c	.....	.....	.....	.....	.....	.....	.....	*13,000c
Salina	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....
Topeka	.....	.....	.....	75,000c	.....	.....	.....	33,000c	.....	.....	.....	.....
Wichita	.5	.....	.....	4	.....	1.75	.....	.....	.....	.....	.....	.5
Kentucky:												
Dayton	.....	.....	.....	18,000	.....	.....	.....	.....	.....	.....	.....	.....
Lexington	40,000	.....	.....	.....	.....	.....	.....	.....	.....	7,000	.....	.....
Ludlow	.....	.....	.....	.....	.....	.....	.....	.....	17,000c	.....	.....	.....
Owensboro	.....	.....	.....	.....	.....	.....	.....	.....	15,000m	.....	.....	.....
Louisiana:												
Alexandria	.....	.....	.....	.....	5,500	.....	.....	.....	.....	.....	.....	.....
Crowley	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	25,000*
Lake Charles	40,000	.....	.....	3,400	60,000	.....	.....	.....	.....	.....	.....	.....
Maine:												
Rockland	.....	.....	2,500c	.....	.....	.....	.....	.....	2,500c	.....	9,000m*	.....
Maryland:												
Annapolis	.....	.....	.....	.....	.....	.....	.....	3,000c	.....	.....	.....	.....
Cumberland	.....	.....	.....	21,000	.....	.....	.....	.....	.....	.....	.....	5,980*
Westminster	.....	50m	.....	.....	.....	100m	.....	.....	.....	700m	.....	.....
Massachusetts:												
Lowell	.....	.....	25,000m	.....	.....	.....	.....	.....	.....	22,000	7,000	2,000
Lynn	.....	.....	7,500m	.....	.....	20,000c	.....	.....	.....	100,000m	.....	.....
New Bedford	.....	.....	10,000	.....	.....	.....	25,000	.....	.....	80,000	.....	.....
Somerville	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	$50,000*
Southbridge	.....	.....	.....	1,000	.....	.....	.....	.....	.....	6,500	.....	.....
Springfield	.....	.....	2,927	.....	.....†	.....	.....†	.....	.....†	.....	.....	.....
Michigan:												
Albion	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....
Alpena	.....	.....	.....	.....	.....	12,000m	.....	.....	.....	.....	.....	.....
Battle Creek	.....	.....	.....	22,000	.....	.....	.....	.....	.....	.....	.....	.....
Cheboygan	.....	.....	.....	.....	.....	.....	.....	.....	3,000	.....	.....	.....
Detroit	17,000c	.....	.....	10,000c	2,000c (180,000)c	.....	.....	.....	.....	.....	.....	.....
Escanaba	.....	.....	.....	.....	.....	20,671	.....	.....	.....	1,000	.....	.....
Grand Lodge	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,600m	.....
Hillsdale	.....	.....	.....	.....	.....	.....	.....	10,000c*	.....	.....	.....	.....
Holland	.....	.....	.....	.....	.....	.....	.....	12,000c	.....	.....	.....	.....
Kalamazoo	.....	.....	.....	15,000	.....	.....	.....	.....	40,000	.....	.....	.....
Lansing	.....	.....	.....	.....	.....	60,000m	.....	.....	.....	.....	.....	.....
Monroe	.....	.....	.....	.....	.....	25,000	.....	.....	.....	.....	.....	.....
Owosso	.....	.....	.....	6,500c	.....	2,500c	.....	.....	.....	9,600m	.....	.....
Sault Ste. Marie	.....	.....	.....	.....	.....	.....	.....	.....	26,600	.....	.....	.....
Minnesota:												
Bemidji	.....	.....	.....	.....	.....	16,000	.....	.....	.....	.....	.....	.....
Crookston	14,349	.....	.....	.....	.....	.....	.....	.....	6,527	.....	.....	.....
Faribault	.....	.....	.....	14,000*	.....	.....	.....	.....	.....	.....	14,500	.....
Mankato	.....	.....	.....	800	.....†	.....	.....	.....	.....†	.....	.....	.....
Winona	.....	.....	.....	5,340	.....	.....	.....	.....	.....	.....	.....	.....
Mississippi:												
Grenada	.....	.....	.....	.....	60,000	.....	.....	.....	.....	.....	.....	.....
Port Gibson	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	11,000	.....
Tupelo	.....	.....	.....	.....	.....	.....	.....	.....	50,000	.....	.....	.....
Vicksburg	.....	.....	.....	30,000c	.....	.....	.....	.....	.....	.....	2,172c	.....
West Point	.....	.....	.....	.....	.....	.....	.....	.....	.....	11,000c	.....	.....
Missouri:												
Bethany	.....	.....	.....	.....	.....	15,000c	.....	.....	.....	.....	.....	.....
Brookfield	.....	.....	.....	40,000c	.....	.....	.....	.....	.....	.....	.....	.....
Butler	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Carrollton	.....	.....	.....	30,000	.....	.....	.....	.....	.....	.....	.....	.....
Columbia	.....	.....	.....	32,000	.....	.....	.....	.....	.....	.....	.....	.....
De Soto	.....	.....	.....	.....	.....	.....	.....	.....	.....	13,830c	.....	.....
Eldorado Springs	.....	.....	.....	.....	.....	12,500	.....	.....	.....	.....	.....	.....
Fulton	.....	.....	.....	1,000c	.....	.....	.....	.....	2,200c	.....	.....	12,000c
Hannibal	.....	.....	.....	40,000	.....	10,000	.....	30,000	.....	.....	.....	.....
Kansas City	160,000	.....	30,000	.....	28,000	105,000	.....	.....	.....	.....	.....	.....
Kirksville	.....	.....	.....	11,715	.....	6,300	.....	.....	.....	.....	.....	.....
Lexington	.....	.....	.....	.....	.....	.....	.....	.....	16,600	.....	.....	.....
Liberty	.....	.....	.....	.....	.....	33,000	.....	.....	.....	.....	.....	.....
Mexico	.....	.....	.....	10,120	.....	.....	.....	.....	.....	.....	.....	.....
Moberly	.....	.....	.....	21,000c	.....	.....	.....	.....	.....	.....	.....	.....
Nevada	.....	.....	.....	10,000	.....	20,000	.....	.....	10,000	.....	.....	.....
Poplar Bluff	.....	.....	30,000	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Charles	.....	.....	.....	.....	.....	18,000	.....	9,000	.....	.....	.....	.....
Sedalia	.....	.....	.....	44,000c	.....	.....	.....	.....	.....	.....	.....	.....
Montana:												
Bozeman	.....	.....	.....	.....	.....	20,000	.....	.....	.....	.....	.....	.....
Great Falls	.....	.....	.....	.....	.....	42,700c	.....	.....	.....	.....	.....	.....
Helena	.....	.....	.....	15,000	.....	.....	.....	.....	.....	.....	.....	.....
Missoula	.....	.....	.....	24,000c	.....	.....	.....	.....	.....	.....	.....	.....
Nebraska:												
Fremont	.....	.....	.....	17,733	.....	1,991	.....	.....	.....	.....	.....	.....
Lincoln	.....	30,000	.....	10,000	.....	.....	10,000	.....	.....	.....	.....	.....
Norfolk	.....	.....	.....	.....	.....	.....	.....	50,000	.....	.....	.....	.....
South Omaha	.....	.....	.....	65,000	.....	8,000	.....	50,000	.....	.....	.....	.....
New Hampshire:												
Dover	.....	.....	12,000c	.....	.....	.....	.....	.....	.....	2m	3m	m 1
Laconia	.....	.....	.....	.....	.....	.....	.....	.....	15,000	.....	.....	.....

(For footnotes, see page 438.)

TABLE No. 4—ESTIMATE OF PAVEMENT TO BE LAID IN 1912 (Continued)

Name of city.	Sheet asphalt.	Asphalt block.	Granite, sandstone or other stone block.	Brick or clay block.	Creosoted wood block.	Concrete.	Bitulithic.	Bituminous: Concrete.	Bituminous: Macadam.	Plain or water-bound macadam.	Gravel.	Other kinds
New Jersey:												
Bloomfield	.....	.....	3	.....	.....	.....	.5	.....	.....	3	.....	.....
Elizabeth	.....	.....	16,760	46,676	.....	.....	.....	4,184	.....	.....	.....	.....
Jersey City	2,500c	.....	13,260c	5,447c	.....	.....	.....	.....	3,500c	.....	.....	.....
Montclair	.....	.....	.....	.....	.....	.....	.....	.....	.....	264,000	.....	.....
Newark	.....	.....	5	5	.....	.....	6	.....	.....	.....	.....	.....
Phillipsburg	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,000	.....	.....
Rutherford	.....	.....	.....	30,000	.....	.....	.....	.....	1.5	1.5	.....	.....
Summit	.....	.....	.....	24,500c	.....	.....	.....	.....	.....	10,000c M	.....	.....
Westfield	.....	.....	.....	.....	.....	.....	.....	.....	10,000c	15,000c	.....	.....
West New York	.....	.....	20,000c	.....	.....	.....	.....	.....	.....	.....	.....	.....
New Mexico:												
Albuquerque	.....	.....	.....	.....	.....	.....	25,000	.....	.....	.....	.....	.....
New York:												
Albany	.....	.....	5,000	40,000	.....	4,000	.....	.....	3,000	.....	.....	.....
Binghamton	.....	.....	.....	20,000c‡	15,583c‡	1,580c	.....	.....	15,000c	.....	5M	.....
Carthage	.....	.....	.....	7,500	.....	.....	.....	.....	33,000	.....	.....	.....
Cortland	10,000	.....	.....	.....	.....	.....	.....	.....	6,000	.....	.....	.....
Dobbs Ferry	.....	.....	.....	20,000	.....	.....	.....	.....	.....	20,000	.....	.....
Dunkirk	10,000	.....	.....	28,000	.....	.....	.....	.....	.....	.....	.....	.....
Elmira	.....	.....	.....	18,000c	.....	.....	.....	.....	.....	.....	.....	.....
Fulton	.....	.....	.....	31,000	.....	.....	.....	.....	17,000	.....	.....	.....
Herkimer	.....	.....	.....	.....	.....	.....	14,431c	.....	.....	.....	.....	.....
Hudson	.....	.....	.....	9,000c	.....	1,800	.....	.....	5,000	600	.....	.....
Jamestown	.....	.....	.....	50,000	.....	.....	.....	.....	.....	.....	.....	.....
Kingston	.....	.....	5,000M	5,000M	.....	.....	.....	.....	10,000M	20,000M	.....	.....
Lestershire	.....	.....	.....	16,000	.....	.....	.....	.....	.....	.....	.....	.....
Little Falls	.....	.....	.....	3,000c	.....	.....	.....	.....	10,000c	.....	.....	*7,000c
Middletown	.....	.....	.....	10,000	.....	.....	.....	.....	.....	.....	.....	.....
New York:												
Bronx	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,095,600c	.....	.....
Brooklyn	850,000c	38,000c	192,000c	.....	57,000c	.....	19,000c	.....	.....	19,000c	.....	19,000c
Manhattan	550,000c	75,000c	300,000c	.....	135,000c	.....	.....	.....	.....	.....	.....	.....
Niagara Falls	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	40,000*
Norwich	.....	.....	.....	10,000	.....	.....	.....	.....	.....	.....	.....	.....
Ogdensburg	.....	.....	.....	40,000	.....	.....	.....	.....	.....	.....	.....	.....
Poughkeepsie	.....	.....	.....	26,400	.....	.....	.....	.....	.....	.....	.....	.....
Salamanca	.....	.....	.....	11,000M	.....	.....	.....	.....	.....	.....	.....	.....
Syracuse	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100,000
Utica	20,000	.....	.....	10,000	.....	.....	10,000	.....	.....	.....	.....	.....
Watertown	.....	.....	.....	12,000c	.....	1,100c	.....	.....	9,000M	25,000M	.....	.....
White Plains	.....	.....	.....	1,000c	.....	500c	.....	.....	3,000c	.....	.....	.....
North Carolina:												
Goldsboro	.....	.....	.....	.....	.....	.....	.....	.....	10,000	.....	.....	.....
Greensboro	.....	.....	.....	.....	.....	.....	.....	.....	15,000	4,000	.....	.....
Monroe	.....	.....	.....	.....	.....	.....	.....	.....	40,000	.....	40,000	.....
Raleigh	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	150,000*
Ohio:												
Ashland	.....	.....	.....	12,000c	.....	.....	.....	.....	.....	.....	.....	.....
Cambridge	.....	.....	.....	.25	.....	.....	.....	.....	.....	.....	.....	.....
Canton	.....	.....	.....	142,760c	.....	.....	.....	.....	.....	.....	.....	.....
Circleville	.....	.....	.....	30,000	.....	.....	.....	.....	.....	.....	.....	.....
Cleveland	.....	.....	37,700c	385,800c	.....	.....	.....	.....	12,800c	.....	.....	.....
Columbus	45,000c	.....	.....	265,000c	.....	.....	.....	.....	.....	.....	.....	.....
Conneaut	.....	.....	.....	20,000	.....	.....	.....	.....	.....	.....	.....	.....
East Liverpool	.....	.....	.....	40,000c	.....	.....	.....	.....	.....	.....	.....	.....
East Palestine	.....	.....	.3c	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fostoria	.....	.....	.....	26,600	.....	.....	.....	.....	.....	.....	.....	.....
Galion	.....	.....	.....	9,381	.....	.....	.....	.....	.....	.....	.....	*26,268c
Hamilton	50,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	12,000	.....
Lancaster	.....	.....	.....	30,000c	.....	.....	.....	.....	.....	.....	.....	.....
Lima	.....	.....	.....	2,720c	.....	.....	.....	.....	.....	.....	.....	.....
Lorain	15,000c	.....	.....	20,000c	.....	.....	.....	.....	.....	.....	.....	.....
Marion	.....	.....	.....	.....	.....	.....	.....	.....	1,320c	5,160c	.....	*15,000c
Massillon	.....	.....	.....	26,000c	.....	.....	.....	.....	.....	.....	52,000c M	.....
Miamisburg	.....	.....	.....	.....	.....	.....	.....	.....	.....	1c	.....	.....
Mount Vernon	.....	.....	.....	15,000‡	.....	15,000‡	.....	.....	.....	.....	.....	.....
Newark	.....	.....	.....	30,000	.....	.....	.....	.....	.....	.....	.....	.....
Niles	.....	.....	.....	4c	.....	.....	.....	.....	.....	.....	.....	.....
Norwood	.....	.....	.....	.....	.....	2,000	.....	.....	15,000	.....	.....	.....
Oberlin	.....	.....	.....	19,560c	.....	.....	.....	.....	.....	.....	.....	.....
Pomeroy	.....	.....	.....	6,000c	.....	.....	.....	.....	.....	.....	.....	.....
Port Clinton	.....	.....	.....	8,300c	.....	.....	.....	.....	.....	.....	.....	.....
Sandusky	10,000	.....	.....	.....	.....	.....	.....	.....	4,090	.....	.....	.....
Springfield	1	.....	.....	2.8	.....	.....	.....	2.5	.....	0.6	.....	.....
Upper Sandusky	16,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Warren	.....	5,000	.....	15,000	5,000	.....	.....	.....	.....	..... †	.....	.....
Zanesville	.....	.....	.....	27,000c	.....	.....	.....	.....	.....	.....	.....	.....
Oklahoma:												
Altus	.....	.....	.....	.....	.....	.....	30,000	.....	.....	.....	.....	.....
Bartlesville	.....	.....	.....	14,200	.....	.....	41,910	.....	.....	.....	.....	.....
Clinton	100,000	.....	.....	.....	.....	.....	.....	.....	10,000c	.....	.....	.....
Durant	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
El Reno	28,600	.....	.....	.....	.....	.....	.....	69,000	.....	.....	.....	.....
Hugo	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mangum	7,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Muskogee	100,000	.....	.....	15,000	.....	.....	.....	25,000	20,000	.....	.....	.....
Sapulpa	35,000	.....	.....	20,000	.....	.....	.....	.....	.....	.....	.....	.....
Shawnee	2.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oregon:												
Albany	.....	.....	.....	.....	.....	.....	75,000c	.....	.....	.....	.....	.....
Astoria	.....	.....	.....	.....	3,000	3,000	15,000	.....	.....	3,000	.....	5,000
Baker City	.....	.....	.....	.....	.....	.....	35,700c	.....	.....	.....	.....	.....
Grants Pass	.....	.....	.....	.....	.....	.....	17,800	.....	15,000	21,700	.....	.....
McMinnville	.....	.....	.....	.....	.....	.....	.....	40,000c	.....	14,000c	.....	.....
Oregon City	25,000	.....	.....	.....	.....	.....	.....	.....	12,000	.....	.....	.....
Portland	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	55*
The Dalles	.....	.....	.....	.....	.....	.....	20,000	.....	7,000	.....	.....	.....

(For footnotes, see page 438.)

TABLE No. 4—ESTIMATE OF PAVEMENT TO BE LAID IN 1912 (Continued)

Name of city.	Sheet asphalt.	Asphalt block.	Granite, sandstone or other stone block.	Brick or clay block.	Creosoted wood block.	Concrete.	Bitulithic.	Bituminous—Concrete.	Bituminous—Macadam.	Plain or water-bound macadam.	Gravel.	Other kinds
Pennsylvania:												
Allentown	40,000	.....	.....	.....	.....	.....	.....	.....	10,000	.....	.....	.....
Bethlehem	.....	.....	.....	.....	.....	.....	.....	.....	6,000	.....	.....	.....
Bloomsburg	.....	.....	.....	1,250M	.....	.....	.....	.....	.....	.....	.....	.....
Carbondale	.....	.....	.....	50,000c	.....	.....	.....	.....	.....	.....	.....	.....
Carlisle	.....	.....	.....	13,000	.....	.....	.....	.....	4,000	12,000	.....	.....
Clearfield	.....	.....	.....	4,000	.....	.....	.....	.....	.....	.....	.....	.....
Du Bois	.....	.....	.....	11,000	.....	.....	.....	.....	.....	.....	.....	.....
Easton	.....	.....	.....	2,900c	.....	.....	.....	.....	.....	.....	.....	8,000*
East Stroudsburg	.....	.....	.....	1.25c	.....	.....	.....	.....	.....	.....	.....	.....
Forest City	.....	.....	.....	5,300	.....	.....	.....	.....	.....	.....	.....	.....
Franklin	.....	.....	.....	20,000	.....	.....	.....	.....	.....	.....	.....	.....
Harrisburg	150,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hazleton	.....	.....	.....	12,132	.....	.....	.....	.....	.....	.....	.....	.....
Hollidaysburg	.....	.....	.....	2,000	.....	.....	.....	.....	.....	.....	.....	.....
Indiana	.....	.....	.....	2,000	.....	.....	.....	.....	.....	.....	.....	.....
Kingston	.....	.....	.....	5,000	.....	.....	.....	.....	.....	.....	.....	.....
McKeesport	.....	.....	.....	50,700c	.....	.....	.....	.....	.....	.....	.....	.....
Mechanicsburg	.....	.....	.....	6,000	.....	.....	.....	.....	.....	.....	.....	.....
Nazareth	.....	.....	.....	.....	.....	.....	.....	.....	2,500	.....	.....	.....
Northumberland	.....	.....	.....	6,000M	.....	.....	.....	.....	.....	.....	.....	.....
Old Forge	.....	.....	.....	.....	.....	.....	.....	.....	48,555	.....	.....	.....
Plymouth	.....	.....	.....	8,000c	.....	.....	.....	.....	.....	.....	.....	.....
Punxsutawney	.....	.....	.....	7,806c	.....	.....	.....	.....	.....	.....	.....	.....
Rankin	.....	.....	.....	7,000	.....	.....	.....	.....	.....	.....	.....	.....
Scranton	11,266	.....	942	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Bethlehem	.....	.....	.....	.....	.....	.....	18,000	22,000	.....	.....	.....	.....
Wilkes-Barre	25,000	.....	.....	25,000	.....	.....	.....	.....	.....	.....	.....	.....
Wilkinsburg	.....	.....	.....	18,000	.....	.....	.....	.....	.....	.....	.....	.....
Williamsport	.....	.....	.....	20,579	.....	.....	.....	.....	.....	.....	.....	.....
Rhode Island:												
East Providence	.....	.....	.....	.....	.....	.....	.....	.....	8,000	17,500	7,500	.....
Providence	.....	.....	10,274	.....	.....	.....	.....	.....	.....	50,000	.....	.....
South Carolina:												
Columbia	25,000	.....	.....	.....	.....	.....	10,000	.....	.....	.....	.....	.....
Gaffney	.....	.....	.....	.....	.....	.....	10,000	.....	.....	10,000	.....	.....
Greenville	.....	.....	.....	.....	.....	.....	.....	15,000	.....	.....	.....	.....
South Dakota:												
Mitchell	.....	.....	.....	.....	.....	30,000	.....	.....	.....	.....	.....	.....
Pierre	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	17,000	.....
Tennessee:												
McKenzie	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	50,000	.....
Texas:												
Austin	.....	.....	.....	.....	7,264	3,067	23,264	.....	.....	.....	.....	.....
Beaumont	30,000	.....	.....	.....	30,000	.....	.....	30,000	.....	.....	.....	.....
Dallas	.....	.....	.....	.....	3.5c	.....	5.6c	.....	3.0c	.....	.....	.....
Paris	23,000c	.....	.....	.....	.....	.....	.....	5,000	.....	.....	.....	.....
Quanah	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	10,000*
San Angelo	.....	.....	.....	.....	25,000	.....	.....	40,000	.....	.....	.....	.....
Tyler	.....	.....	.....	7,000	.....	.....	.....	.....	.....	.....	.....	.....
Utah:												
Logan	.....	.....	.....	.....	.....	.....	36,000	.....	.....	.....	.....	.....
Virginia:												
Covington	.....	.....	.....	1,500M	.....	.....	.....	.....	.....	.....	.....	.....
Danville	.....	.....	.....	9,000	.....	.....	.....	10,000	.....	.....	.....	.....
Fredericksburg	.....	.....	.....	.....	.....	.....	.....	.....	.....	13,000c	.....	.....
Suffolk	.....	.....	.....	4,000	.....	.....	.....	.....	.....	.....	.....	.....
Washington:												
Bellingham	49,220	.....	.....	.....	.....	.....	.....	5,615	.....	.....	.....	.....
North Yakima	.....	.....	.....	10,000	.....	.....	.....	.....	.....	.....	.....	13,000
Aberdeen	90,000	.....	.....	.....	.....	10,000	.....	.....	.....	.....	.....	.....
Colfax	.....	.....	.....	.....	.....	.....	40,000	.....	.....	.....	.....	.....
Seattle	138,000c	.....	8,500c	100,000c	.....	.....	.....	.....	.....	.....	.....	.....
Vancouver	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	60,000*
Walla Walla	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	25,000*
Snohomish	.....	.....	.....	8,120	.....	.....	.....	.....	.....	.....	.....	.....
West Virginia:												
Follansbee	.....	.....	.....	3,000	.....	.....	.....	.....	.....	.....	.....	.....
Wisconsin:												
Antigo	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,000	.....	.....
Appleton	.....	.....	.....	.....	.....	10,000	.....	.....	.....	.....	2	.....
Baraboo	.....	.....	.....	.....	.....	.....	.....	.....	.....	8,000	.....	.....
Burlington	...	.....	.....	9,300	.....	1,330	.....	.....	.....	.....	.....	.....
Chippewa Falls	.....	.....	.....	.....	.....	675	.....	10,000	6,600	.....	.....	.....
Columbus	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	*16,000c
Fond du Lac	.....	.....	.....	.....	.....	8,000	.....	.....	.....	.....	6,500	.....
Janesville	.....	.....	.....	6,373	.....	.....	.....	.....	.....	.....	.....	.....
Kenosha	25,000	.....	.....	40,000	.....	.....	.....	.....	.....	.....	.....	.....
Merrill	.....	.....	.....	.....	10,000	.....	.....	.....	.....	.....	.....	.....
Marinette	.....	.....	.....	.....	.....	.....	.....	.....	.....	12,000	.....	.....
Neenah	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20,112*
Oshkosh	8,624	.....	.....	.....	2,910 (7,560)	5,150	.....	.....	3,910	.....	.....	.....
Superior	8,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Waukesha	.....	.....	.....	1,800c	.....	.....	.....	.....	31,000c	.....	.....	.....

* Kind of pavement not yet decided upon.
† Amount uncertain.
‡ One or the other of these.
NOTE.—Figures given in parentheses are for untreated wood blocks.

TABLE No. 5.

SIDEWALKS, CURBS AND GUTTERS LAID IN 1911.

Name of city.	Sidewalks 1. Amount laid in 1911.	2. Materials used.	3. Paid for by.	4. Method of payment.	Curbs 5. Amount laid in 1911.	6. Materials used.	7. Paid for by.	8. Method of payment.	Gutters 9. Amount laid in 1911.	10. Materials used.	11. Paid for by.	12. Method of payment.
Alabama:												
Dothan.[1]	45,000†	Concrete	O.	A	64,000*	Concrete	O.	A	64,000*	Concrete	O.	A
Florence	2,500†	Slag concrete	O.	B	4,200*	Slag concrete	O.	B	4,200*	Slag concrete	O.	B
Gadsden	10,500*	Slag concrete	O.	A10	2,600*	Slag concrete	O.	A10	2,600*	Slag concrete	O.	A10
Huntsville	4,000*	.....	O.	A	.....	.....	.....	.....	.....	.....	.....	.....
Troy	21,000†	Concrete	O.	A	.....	.....	.....	.....	.....	.....	.....	.....
Arizona:												
Nogales	1,200†	Concrete	C. & O.	T	.....	.....	.....	.....	.....	.....	.....	.....
Arkansas:												
Fayetteville	6,000†	Concrete	O.	U	10,000*	.....	.....	.....	10,000*	.....	.....	.....
Fort Smith	23,000*	.....	O.	T	36,500	.....	O.	T	.....	.....	.....	.....
California:												
Fresno	26,940*	Concrete	O.	T U	14,000*	Concrete	O.	T or U	8,500†	Concrete	O.	U
Grass Valley	2,600*	Concrete	O.	T	.....	.....	.....	.....	1,000*	Concrete	C.	.....
Los Angeles	232,000*	Concrete	O.	A	303,000*	Concrete	O.	A	349,500*	Conc., brick & granite	O.	A
Marysville	26,000*	Concrete	O.	U	.....	.....	.....	.....	.....	.....	.....	.....
Modesto	40,000*	Concrete	O.	U	.....	.....	.....	.....	.....	.....	.....	.....
San Raphael	3,000*	Concrete	O.	U	1,000*	Concrete	O.	U	.....	.....	.....	.....
Sacramento	.....	Concrete	O.	U	115,708*	Concrete	O.	U	83,388*	Concrete	O.	U
San Jose	8,574*	Concrete	O.	U	47,791*	Concrete	O.	U	47,791*	Concrete	O.	U
Santa Barbara	.....	.....	O.	T	.....	.....	.....	.....	.....	.....	.....	.....
San Bernardino	24,000*	Concrete	O.	U	25,000*	Concrete	O.	U	5,280*	Concrete	O.	U
Santa Cruz	1,000*	Concrete	O.	T	.....	.....	.....	.....	4,268*	Concrete	O.	T
Stockton	.....	Concrete	O.	T	26,000*	Concrete	O.	F	26,000*	Concrete	O.	F
Vallejo	5,000†	Concrete	O.	U	10,000*	Concrete	O.	U	.....	.....	.....	.....
Colorado:												
Boulder	.....	.....	.....	T	.....	.....	.....	T	.....	.....	.....	T
Florence	29,300†	Concrete	O.	B16 (6)	500*	Concrete	O.	B16 (6)	300*	Concrete	O.	B16 (6)
Fort Collins	3,800*	Conc. & stone	O.	T	1,500	Concrete	O.	T	100*	Concrete	O.	T
Grand Junction	7,300*	Concrete	O.	A or T	6,000*	Concrete	O.	A	6,000*	Concrete	O.	A
Ouray	2,000†	Concrete	O.	T	.....	.....	.....	.....	300*	.....	.....	.....
Connecticut:												
Ansonia	1,000†	Tar	O.	T	5,000*	Grnite & conc.	O.	T	5,000*	Flag & cobble	.....	.....
East Hartford	7,000†	Concrete	O.	U	500*	Concrete	C.	.....	.....	.....	.....	.....
Greenwich	1,300*	Concrete	O.	T	.....	.....	.....	.....	.....	.....	.....	.....
Hartford	.....	Flag or conc.	O.	T	.....	Grnite or conc.	O.	T	.....	Flag or conc.	O.	T
New London	18,600†	Concrete	C. & O.[2]	F	.....	.....	.....	.....	.....	.....	.....	.....
Norwich	500*	Conc. or asph.	O.	T	500*	Granite	O.	T	500*	Cobble	C.	.....
Southington	.....	Concrete	O.	T	.....	Bl. stn or conc.	O.	U	.....	Cobble	C.	.....
Torrington	.....	.....	O.	T	2,000*	Grnite or conc.	O.	.....	3,000*	Concrete	C.	.....
Delaware:												
Milford	.....	.....	.....	.....	1,500*	Concrete	C. & O.[2]	U	500†	Concrete	C.	.....
Wilmington	.....	.....	O.	T	.....	.....	O.	T	.....	.....	O.	T
Dist. of Columbia:												
Washington	63,945†	Concrete	C. & O.[2]	M	23,215	Granite	C. & O.[2]	M	21,519†	Cobble or brk.	.....	.....
Florida:												
Gainesville	3,500†	Crushed rock	O.	U	3,000	Grnite or conc.	O.	U	.....	.....	.....	.....
Palatka	28,400*	Concrete	O.	X 6	.....	.....	.....	.....	.....	.....	.....	.....
Pensacola	18,000†	Concrete	O.	N	.....	.....	.....	.....	.....	.....	.....	.....
St. Petersburg	120,000*	Oct. conc. blks.	O.	G	.....	.....	.....	.....	.....	.....	.....	.....
Georgia:												
Albany	11,000†	Concrete	O.	N	.....	.....	.....	.....	.....	.....	.....	.....
Americus	4,833†	Conc. or art. stone blocks	O.	T	27,492*	Concrete	O.	U	27,492*	Concrete	C.	.....
Columbus	6,152†	Concrete	O.	H(7)	19,260*	Granite	O.	H7	13,304*	Concrete	C. & O.[2]	H7
Dublin	3,000*	Tile or conc.	O.	S	4,000*	Grnite or conc.	C. & O.[2]	S	.....	.....	.....	.....
Idaho:												
Boise	9,541*	.....	O.	A10	9,022*	.....	.....	.....	.....	.....	.....	.....
Pocatello	9,450†	Gravel	O.[4]	T	11,700*	.....	O.[4]	T	.....	.....	.....	.....
Illinois:												
Alton	.....	.....	.....	.....	24,710*	Conc. or lmstn	O.	A	24,110*	Concrete	O.	A
Bloomington	21,821*	.....	O.	T & U	22,002	Stone or conc.	O.	A	12,371*	Concrete	O.	A
Carlinville	3,000*	Gravel conc.	C. & O.[2]	T	.....	.....	.....	.....	.....	.....	.....	.....
Danville	.....	.....	.....	.....	18,000*	Sandstone	C. & O.[2]	R	.....	.....	.....	.....
De Kalb	4,000*	Concrete	O.	U	.....	.....	.....	.....	.....	.....	.....	.....
Galena	.....	.....	O.	T	.....	.....	.....	.....	.....	.....	.....	.....
Galva	940*	Concrete	C. & O.[2]	U	.....	.....	.....	.....	.....	.....	.....	.....
Greenville	5,000*	Concrete	O.	T	.....	.....	.....	.....	.....	.....	.....	.....
Harrisburg	6,200*	Concrete	O.	U	.....	.....	.....	.....	.....	.....	.....	.....
Highland Park	15,000*	Concrete	O.	.....	27,600*	Sndstn or con.	O.	A	.....	.....	.....	.....
Jerseyville	4,800†	Concrete	O.	U	.....	.....	.....	.....	.....	.....	.....	.....
Marengo	2,500*	Concrete	O.	A	4,000*	.....	O.	.....	4,000*	.....	C. & O.	.....
Marion	.....	.....	.....	.....	.....	.....	.....	.....	C 5,869	Lmstn or flint	O.	A10
Mattoon	15,000*	Concrete	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Moline	15,200*	Concrete	O.	A5	27,762*	Con. or sndstn	O.	A10	.....	.....	.....	.....
Monmouth	7,000*	Concrete	C. & O.[2]	T	.....	.....	.....	.....	.....	.....	.....	.....
Normal	8,000*	Concrete	O.	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oak Park	33,092*	Concrete	C. & O.	P	33,598*	Concrete	O.	Q	33,598*	Concrete	O.	Q
Paris	2,000*	Concrete	O.	U	.....	.....	.....	.....	.....	.....	.....	.....
Pekin	.....	.....	.....	.....	.....	Concrete	O.	A10	10,000*	Concrete	O.	A10
Rockford	.....	Concrete	O.	T	.....	Concrete	O.	T	.....	Concrete	O.	T
Springfield	.....	.....	O.[4]	A5	35,820*	Sandstone	O.[4]	A5	2,015*	Concrete	O.[3]	A5
Streator	9,000*	Brick or conc.	O.[3]	.....	.....	.....	.....	.....	.....	.....	.....	.....
Waukegan	4,300*	Concrete	O.	A or T	1,200*	Concrete	O.	A	1,200*	Concrete	O.	A
Wheaton	7,000*	Concrete	O.	U	.....	.....	.....	.....	.....	.....	.....	.....
Indiana:												
Anderson	29,060*	Concrete	O.	A	4,406*	Concrete	O.	A	.....	.....	.....	.....
Bedford	4,485*	Concrete	O.[4]	B10 (6) or J.	5,062*	Stone	O.[4]	B10 (6) or J	.....	.....	.....	.....
Bloomington	10,000*	Concrete	O.	A	4,000*	Concrete	O.	A	8,000*	Concrete	O.	A
Crawfordsville	5,499†	.....	O.	A	4,590*	.....	O.	A	4,590	.....	O.	.....
East Chicago	123,892*	Concrete	O.	A10	57,092*	Concrete	O.	A10	35,131	Concrete	O.	A10
Fort Wayne	43,822†	Concrete	O.	A or T	.....	.....	.....	.....	.....	.....	.....	.....
Greencastle	6,000†	Concrete	O.	A	10,000*	Concrete	.....	.....	8,500*	.....	.....	.....
Huntington	5,000*	Concrete	O.	U	.....	.....	.....	.....	.....	.....	.....	.....
Kokomo	36,400*	Concrete	C. & O.	A10	27,400*	.....	.....	.....	22,400*	.....	.....	.....
Mishawaka	11,390*	Conc. or gravl.	O.	A or T	8,700*	Concrete	O.	A or T	.....	.....	.....	.....
Muncie	2,674*	Concrete	O.[4]	.....	13,588*	Concrete	O.[4]	.....	13,588*	Concrete	O.[4]	.....
Noblesville	2,640*	Concrete	O.	A	2,920*	Concrete	O.	A	.....	.....	.....	.....
Portland	3,000*	Concrete	O.	T	.....	.....	.....	.....	.....	.....	.....	.....
Richmond	52,000*	Concrete	O.	A10	30,600*	Concrete	O.[3]	A10	30,600*	Concrete	O.[4]	A10

(For footnotes, see page 443.)

TABLE No. 5—SIDEWALKS, CURBS AND GUTTERS LAID IN 1911 (Continued)

Name of city.	Sidewalks 1. Amount laid in 1911.	2. Materials used.	3. Paid for by.	4. Method of payment.	Curbs 5. Amount laid in 1911.	6. Materials used.	7. Paid for by.	8. Method of payment.	Gutters 9. Amount laid in 1911.	10. Materials used.	11. Paid for by.	12. Method of payment.
Indiana (Continued):												
Rushville	4,842*	Concrete	O.[4]	A10 or T	.....	.....	.....	.....	.....	.....	.....	.....
Shelbyville	22,960*	Concrete	O.	S	38,380*	Concrete	O.	S or T	38,380*	Concrete	O.	S or T
Wabash	3,550†	Concrete	O.	A10	.....	.....	.....	.....	.....	.....	.....	.....
Washington	16,000*	Concrete	O.	A10	6,800*	Concrete	O.	A10	6,800*	Concrete	O.	A10
West Lafayette	1,500†	Gravel-conc.	O.	A10	.....	.....	.....	.....	.....	.....	.....	.....
Iowa:												
Ames	2,317*	Gravel-conc.	O.	A7	4,038*	Gravel-conc.	O.	A7	4,038*	Gravel-conc.	O.	A7
Burlington	26,000*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cedar Rapids	42,768*	Concrete	O.	A	36,000*	Concrete	O.	A	7,296*	Concrete	O.	A
Centerville	5,500*	Concrete	O.	T	.....	.....	.....	.....	.....	.....	.....	.....
Chariton	10,000*	Gravel-conc.	O.	A or T	.....	.....	.....	.....	.....	.....	.....	.....
Dubuque	16,133†	Concrete	C. & O.	A7 (6)	29,153*	Conc. or stone	O.	A7 (6)	29,700*	Concrete	O.	A7 (6)
Emmetsburg	27,000*	Concrete	O.	U	.....	.....	.....	.....	.....	.....	.....	.....
Fort Dodge	15,000*	Concrete	O.	A7 (6)	9,000*	Concrete	O.	A7 (6)	9,000*	Concrete	O.	A7 (6)
Independence	13,200*	Conc. or gravl.	O.[4]	T	.....	.....	.....	.....	.....	.....	.....	.....
Iowa Falls	.....	.....	O.[4]	A7 (6)	.....	.....	.....	.....	.....	.....	.....	.....
Lake City	1,000†	Concrete	O.	T	.....	.....	.....	.....	.....	.....	.....	.....
Marshalltown	4,283*	.....	O.	A	2,400*	.....	.....	.....	.....	.....	.....	.....
Mason City	16*	.....	O.	.....	.....	.....	.....	.....	.....	.....	.....	.....
Missouri Valley	2,640*	Concrete	O.	T	1,000*	Concrete	.....	.....	1,200*	Concrete	.....	.....
Muscatine	23,760*	Concrete	O.	T	10,386*	Concrete	O.	A	2,308†	Concrete	O.	A
Oelwein	4,000*	Gravel-conc.	O.	T	30,000*	Gravel conc.	O.	T	.....	.....	.....	.....
Ottumwa	13,000*	Conc. or brick.	O.	T	1,300*	Concrete	O.	A7	.....	.....	.....	.....
Sioux City	7,000†	Concrete	O.	A7	66,000*	Concrete	O.	A7	66,000*	Concrete	O.	A7
Waterloo	36,382*	Concrete	O.	A7	9,100*	Concrete	O.	A7	38,966*	Concrete	O.	A7
Kansas:												
Atchison	.....	.....	.....	.....	12,187*	Concrete	O.[4]	A	.....	.....	.....	.....
Clay Center	11,560*	Concrete	O.	T	11,560*	Concrete	O.	T	2,640*	Concrete	O.	T
Coffeyville	30,000†	.....	.....	.....	11,000*	Concrete	O.	E	11,000*	Concrete	O.	E
Columbus	.....	Concrete	O.	T	.....	.....	O.	T	.....	.....	O.	T
El Dorado	4,000*	Concrete	O.	U	3,000*	Conc or stone	O.	U	2,800*	Concrete	O.	U
Fort Scott	6,000*	Con. or sndstn	O.[4]	T	21,640*	Con. or sndstn	O.[4]	T	18,800*	Concrete	O.[4]	T
Great Bend	30,000*	Concrete	O.	T	5,000*	Concrete	O.	A	5,000*	Concrete	O.	A
Hutchinson	3,000†	Concrete	O.	T	40,000*	Concrete	O.	S	12,000*	Concrete	O.	A10
Independence	20,000*	Concrete	O.	T	23,200*	Concrete	O.	A10	23,200*	Concrete	O.	A10
Kansas City	59,553*	Granitoid.	O.	.....	110,982*	Granitoid	O.	.....	.....	.....	.....	.....
Lawrence	.....	Concrete	O.	G	48,000*	Concrete	O.	A10	48,000*	Concrete	O.	A10
Leavenworth	336†	Concrete	O.	R	4,697*	Concrete	O.	A10	.....	.....	.....	.....
Lyons	3,100*	Concrete	O.	T	1,200*	Concrete	O.	T	.....	.....	.....	.....
McPherson	.....	.....	.....	.....	6,600*	.....	C. & O.	.....	6,600*	.....	C. & O.	.....
Manhattan	1,200*	Gravel	O.	A	4,000*	.....	O.	A	13,000*	.....	O.	A
Osawatomie	1,000*	Concrete	O.	T	200*	Concrete	O.	T	.....	.....	.....	.....
Ottawa	.....	Conc. or brick.	O.	T	22,335*	Concrete	O.	A	.....	.....	.....	.....
Pittsburgh	4,000*	Brick.	O.[4]	L	6,283*	Limestone	O.[4]	A	.....	.....	.....	.....
Salina	5,000*	Brick or conc.	O.[4]	A	14,213*	Concrete	O.[4]	A	14,213*	Concrete	O.[4]	A
Topeka	10,800†	Conc. or brick.	O.[4]	I	89,378*	Concrete	O.[4]	I	89,520*	Concrete	O.[4]	I
Wichita	87,467*	Concrete	O.[4]	A & T	117,975*	Concrete	O.[4]	A & T	140,297*	Conc. or chats	O.[4]	A & T
Kentucky:												
Dayton	2,000†	Concrete	O.	.....	2,500*	Concrete	O.	.....	.....	.....	.....	.....
Lexington	6,000*	Concrete	O.	J	21,000*	Concrete	O.	J	21,000*	Concrete	O.	J
Ludlow	575*	Gravel & sand	O.	B10	560*	Concrete	O.	B10	560*	Concrete	O.	B10
Owensboro	.....	.....	.....	.....	15,068*	Concrete	C.	.....	15,068*	Concrete	C.	.....
Paducah	19,000†	Concrete	O.	.....	30,860*	Granite	O.	.....	30,816*	Concrete	O.	.....
Louisiana:												
Alexandria	1,200*	.....	.....	T	.....	.....	.....	.....	.....	.....	.....	.....
Crowley	60,000*	Concrete	O.	O	.....	.....	.....	.....	.....	.....	.....	.....
Lake Charles	80,000*	Concrete	O.	D	80,000*	Concrete	O.	D	.....	.....	.....	.....
Monroe	4,000*	Concrete	O.	U	.....	.....	.....	.....	.....	.....	.....	.....
New Orleans	2,343†	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Maine:												
Portland	9,487*	Brick or conc.	.....	.....	6,783*	Granite	.....	.....	7,101*	Cobble or brk.	.....	.....
Rockland	6,000†	Tar concrete	C. & O.[3]	.....	2,300*	Granite	C. & O.[3]	.....	600*	Tar concrete	C.	.....
Maryland:												
Annapolis	.....	.....	O.	T	4,711*	Conc. or gran.	C.	.....	2,533*	.....	C.	.....
Cambridge	5,000†	Concrete	O.	J	13,000*	Concrete	C.	.....	1,000†	Concrete	C.	.....
Cumberland	.....	Conc. or brick.	O.	.....	.....	Conc. or stone	O.	.....	.....	.....	.....	.....
Westminster	400†	Concrete	O.	T	150†	Concrete	O.	T	300†	Concrete	C.	.....
Massachusetts:												
Everett	10,890†	Granolithic, brk or tar conc.	C. & O.[3]	.....	10,000*	Granite	C. & O.[3]	.....	1,075†	Granite block	C.	.....
Greenfield	9,000*	Concrete	O.	U or T	.....	.....	.....	.....	.....	.....	.....	.....
Haverhill	5,470*	Tar conc. or granolithic	C. & O.[3]	.....	6,495*	Granite	C.	.....	6,505*	Cobble	C.	.....
Lawrence	33,364†	Tar conc. or cemnt. conc.	C. & O.[3]	F	18,917*	Conc. or gran.	C. & O.[3]	F	1,239†	Concrete	C.	.....
Lowell	2,747†	Concrete	O.	U	10,739*	Granite	O.	U	2,000*	Cobble	C.	.....
Lynn	5,503†	Granolithic	C. & O.[3]	S	7,143†	Granolithic	C. & O.[3]	S	.....	.....	.....	.....
	1,694†	Tar concrete	O.	A	16,612†	Granite	O.	A	.....	.....	.....	.....
Medford	7,778†	Brk,granolithic or tar conc.	C. & O.[3]	.....	6,485*	Granite	C. & O.[3]	.....	56†	Granite block	C.	.....
New Bedford	20,750*	Granolithic	C. & O.[3]	K	24,101*	Granite	C.	.....	39,616	Cobble	C.	.....
Southbridge	5,750*	Concrete	C. & O.[3]	U	.....	Concrete	C. & O.[3]	U	3,200*	Con. or cobble	C.	.....
Springfield	14,733*	Brk, tar conc. or concrete	O.	R	11,109*	Conc. or gran.	O.	R	.....	.....	.....	.....
Woburn	3,028†	Tar concrete	C. & O.[3]	A3	2,918*	Granite	C. & O.[3]	A3	.....	.....	.....	.....
Worcester	22,556*	Granolithic	C. & O.[3]	.....	34,473*	Granite	C. & O.[3]	.....	29,748	Gran. bks, cobbles & granlthc	C.	.....
Michigan:												
Albion	15,000*	Concrete	C. & O.[3]	U	10,480*	Concrete	C. & O.[3]	C	10,480*	Concrete	C. & O.[3]	C
Alpena	8,820*	Concrete	C. & O.[3]	K	.....	.....	.....	.....	.....	.....	.....	.....
Battle Creek	78,326*	Concrete	C. & O.	A	15,895*	Concrete	C. & O.	A	15,895*	Concrete	C. & O.	A
Cadillac	1,800*	Concrete	C. & O.[7]	T	19,136*	Concrete	O.	T	.....	.....	.....	.....
Cheboygan	.....	Concrete	O.	T	3,000*	Concrete	O.	S	.....	.....	.....	.....
Detroit	254,500†	Concrete	O.	A & T	.....	.....	.....	.....	.....	.....	.....	.....
Escanaba	3,000*	.....	.....	.....	7,270*	Concrete	C. & O.[8]	A	7,270*	Concrete	C. & O.[8]	A
Flint	51,635*	Concrete	O.	C	3,493*	Concrete	O.	C	.....	.....	.....	.....
Grand Lodge	1,700*	Concrete	C. & O.[5]	.....	2,000*	Concrete	C. & O.[8]	.....	.....	.....	.....	.....
Hillsdale	.....	.....	.....	.....	6,700*	Concrete	C. & O.[9]	A5	6,700*	Concrete	C. & O.[9]	A5
Holland	5,000*	Concrete	O.	T	6,000*	Concrete	O.	T	6,000*	Concrete	O.	T
Kalamazoo	20,000*	Concrete	C. & O.[4]	A10	24,000*	Concrete	C. & O.[4]	A10	24,000*	Concrete	C. & O.[4]	A10
Lansing	12,000†	Concrete	C. & O.[4]	A2	.....	.....	.....	.....	.....	.....	.....	.....
Owosso	8,000*	Conc. or gravl.	O.	L	.....	.....	.....	.....	.....	.....	.....	.....
St. Joseph	4,820*	Concrete	O.	U	.....	.....	.....	.....	.....	.....	.....	.....
Sault Ste. Marie	3,458†	Conc. or gravl.	C. & O.[3]	A	1,184*	Concrete	C. & O.[3]	A	.....	.....	.....	.....
Ypsilanti	.....	Concrete	C. & O.[3]	A10	.....	.....	.....	.....	.....	.....	.....	.....

(For footnotes, see page 443.)

TABLE No. 5—SIDEWALKS, CURBS AND GUTTERS LAID IN 1911 (Continued)

Name of city.	Sidewalks: 1. Amount laid in 1911.	2. Materials used.	3. Paid for by.	4. Method of payment.	Curbs: 5. Amount laid in 1911.	6. Materials used.	7. Paid for by.	8. Method of payment.	Gutters: 9. Amount laid in 1911.	10. Materials used.	11. Paid for by.	12. Method of payment.
Minnesota:												
Bemidji	13,200*	Concrete	C.&O.[3,4]	F	2,500*	Concrete	O.	F	.....	.....	.....	.....
Crookston	8,740*	.....	O.[4]	F or T	8,828*	.....	O.[4]	F or T	8,828*	.....	O.[4]	F or T
Faribault	540*	Conc. or brick	O.[4]	T	.....	.....	.....	.....	.....	.....	.....	.....
Fergus Falls	6,500*	Concrete	O.	F	1,500*	Concrete	O.	F	800*	Concrete	O.	F
Lake City	8,000*	Concrete	O.	U	1,000*	Concrete	O.	U	1,000*	Concrete	O.	U
Minneapolis	137,280†	Art. stone.	O.	T or I	401,784*	Grnite or conc.	O.	T or A5	391,984*	Concrete	O.	T or I
Montevideo	1,800*	Gravel-conc.	O.	A or T	.....	.....	.....	.....	.....	.....	.....	.....
St. Paul	83,250	Cement tile	O.	F or T	4,949*	Concrete	O.	F	.....	.....	.....	.....
Winona	2,600*	Conc. or stone.	O.	T	2,375*	Conc. or stone	O.	T	.....	.....	.....	.....
Mississippi:												
Grenada	30,000*	.....	O.	U	.....	.....	.....	.....	.....	.....	.....	.....
Tupelo	.....	Concrete	O.	T	.....	Concrete	O.	T	.....	Concrete	O.	T
Vicksburg	.....	Concrete	O.	T	.....	.....	.....	.....	.....	.....	.....	.....
Missouri:												
Bethany	4,000*	Concrete	O.	T	1,000*	Concrete	O.	R	.....	.....	.....	.....
Brookfield	25,080*	Concrete	O.	A	21,000*	Concrete	O.	A	.....	.....	.....	.....
Carrollton	20,000*	Concrete	O.	U	30,000*	.....	O.	U	.....	.....	.....	.....
Clinton	5,000*	Concrete	O.	U	.....	.....	.....	.....	.....	.....	.....	.....
Columbia	20,851*	Concrete	O.	F	20,500*	Concrete	O.	F	.....	.....	.....	.....
De Soto	6,480*	Concrete	O.	T	.....	.....	.....	.....	.....	.....	.....	.....
El Dorado Springs	20,000*	Concrete	O.	U	2,000*	Concrete	O.	U	.....	.....	.....	.....
Fulton	1,215*	Granitoid	O.	T	10,816*	Granitoid	O.	A	.....	.....	.....	.....
Hannibal	22,000*	Concrete	O.	U	5,000*	Concrete	O.	U	5,000*	Concrete	O.	U
Kansas City	115,000*	Concrete	O.	R60	135,000*	Concrete	O.	R60	20,000*	Concrete	O.	R60
Kirksville	5,280*	Concrete	O.	.....	520*	Concrete	O.	R	.....	.....	.....	.....
Lexington	1,400*	Granitoid	O.	R	.....	.....	.....	.....	.....	.....	.....	.....
Liberty	3,000*	Concrete	O.	T	11,400*	Concrete	O.	R	.....	.....	.....	.....
Macon	10,000*	Concrete	O.	R	5,200*	Concrete	O.	R	.....	.....	.....	.....
Moberly	15,000*	Concrete	O.	T	.....	.....	.....	.....	.....	.....	.....	.....
Nevada	3,600†	Concrete	O.	T	9,000*	Concrete	O.	T	4,300*	Concrete	O.	T
Poplar Bluff	8,000*	Concrete	O.	T	2,000*	Concrete	O.	T	2,500*	Concrete	O.	T
St. Charles	8,848*	Granitoid	O.	R30	17,100*	Granitoid	O.	R30	16,800*	Granitoid	O.	R30
Sedalia	42,000*	Concrete	O.	T	10,560*	Concrete	O.	R	.....	.....	.....	.....
Webb City	24,504*	Concrete	O.	B or T	26,575*	Concrete	O.	B or T	26,248	Conc. or stone	O.	B or T
Montana:												
Billings	34,170*	Concrete	O.	A8 (6)	53,000*	Concrete	O.	A8 (6)	.....	.....	.....	.....
Bozeman	8,700†	Concrete	O.	A5	10,600*	Concrete	O.	A5	.....	.....	.....	.....
Butte	3,880*	Concrete	O.	U	6,080*	Concrete	O.	U	.....	.....	.....	.....
Great Falls	31,150†	Concrete	O.	F	9,512*	Concrete	O.	F	.....	.....	.....	.....
Helena	17,466†	.....	O.	W	23,265*	.....	O.	W	.....	.....	.....	.....
Kalispell	18,856*	Concrete	O.	W	.....	.....	.....	.....	.....	.....	.....	.....
Missoula	19,344†	Concrete	O.	A8 or T	13,650*	Concrete	O.	A8	.....	.....	.....	.....
Nebraska:												
Blair	290*	Concrete	O.	T	.....	.....	.....	.....	.....	.....	.....	.....
Chadron	26,000*	Concrete	O.	T	10,400*	Concrete	O.	T	.....	.....	.....	.....
Fremont	16,650*	Concrete	O.	T	2,000*	Concrete	O.	T	2,500*	Concrete	O.	T
Lincoln	34,458*	.....	O.	A	24,582*	Concrete	O.	A	19,078*	.....	O.	A
Omaha	.....	.....	.....	.....	89,044*	Sandstone	O.[4]	A10	.....	.....	.....	.....
Pawnee City	5,000*	Concrete	O.	T	.....	.....	.....	.....	.....	.....	.....	.....
Red Cloud	3,600*	Gravel-conc.	O.	T	2,040*	Gravel-conc.	O.	T	360*	Gravel-conc.	C.	.....
South Omaha	18,200*	Brick or conc.	O.	U	66,570*	Concrete	O.	A	.....	.....	.....	.....
York	2,460*	Concrete	O.	T	120*	Concrete	O.	T	.....	.....	.....	.....
New Hampshire:												
Dover	1,240†	Brick	O.	U	450*	Granite	C.	.....	3,000*	Cobble	C.	.....
Keene	.....	.....	.....	.....	900*	Granite	C.&O.[10]	U	540*	Granite block	C.	.....
Laconia	700†	Tar concrete	C.	.....	1,000*	Granite	C.	.....	500†	Cobble	C.	.....
New Jersey:												
Bayonne	12,225*	Conc. or bl. stn	O.	C(7) or U	18,160*	Conc. or stone	O.	C(7) or U	.....	.....	.....	.....
Bloomfield	125,000†	Conc. or bl. stn	O.	A10	26,265*	Conc. or bl. stn	O.	A10	2,000*	Conc. or cble	O.	A10
Camden	.....	Concrete	O.	T	.....	Concrete	O.	T	.....	Part of pavmt	.....	.....
Millville	15,000*	Concrete	O.	T or U	1,000*	Bluestone	O.	T or U	3,000*	Conc. or bl. stn	C.	.....
Montclair	22,500*	Concrete	O.	T	10,000*	Concrete	O.	T	10,000*	Concrete	O.	T
Newark	244,300*	Flagging or artificial stne.	O.	F or T	.....	.....	.....	.....	.....	.....	.....	.....
Phillipsburg	500*	Conc. or flag	O.	T	500*	Conc. or stone	O.	T	500*	Con.,stn or cob	C.	.....
Rutherford	5,300*	Concrete	O.	C	3,000*	Concrete	O.	C	3,000*	Concrete	O.	C
Summit	16,000*	Concrete	O.	T or U	8,000*	Concrete	O.	T or U	2,630*	Cobble	O.	T or U
Washington	1,000*	Conc. or flag	O.	T	400*	Conc. or flag	O.	T	200*	Cobble	O.	T
Westfield	5,466*	Conc. or bl. stn	O.	A10	17,662*	Blstn, brk. or concrete	O.	A10	13,239*	Concrete	O.	A10
West Orange	1,811*	Conc. or flag	C.	.....	20,000*	Bluestone	O.	.....	10,000†	Belgian blk.	O.	.....
West New York	22,500*	Conc. or bl. stn	O.	T or S	20,000*	Conc. or blstn.	O.	T or S	1,700†	Conc. or Belgian blk.	O.	.....
New Mexico:												
Albuquerque	4,117*	Concrete	O.	T	.....	.....	.....	.....	.....	.....	.....	.....
New York:												
Albany	19,633†	Conc., flag or brick.	O.	A	23,177*	Grnite or conc.	.....	.....	.....	.....	.....	.....
Binghamton	29,216*	Conc. or stone	C.&O.[2]	T	12,562*	Conc. or stone	C.&O.[2]	U	6,556*	Concrete	C.&O.[2]	U
Buffalo	290,740*	Concrete	O.	F	1,228*	Concrete	O.	F	.....	.....	.....	.....
Carthage	854*	.....	O.	T[11]	4,800*	.....	O.	F	4,800*	.....	C.	.....
Cortland	12,000*	Concrete	C.&O.[3]	U	5,300*	Concrete	C.&O.[12]	A	5,300*	Concrete	C.&O.[12]	A
Dunkirk	57,520*	Concrete	O.	T	3,000*	Concrete	O.	T	3,000*	Concrete	O.	T
Elmira	23,190*	Stne, conc. or tar.	O.	A5	1,978*	Sandstone	O.	U	.....	.....	.....	.....
Fulton	3,370†	Concrete	C.&O.[3]	T	.....	.....	.....	.....	.....	.....	.....	.....
Herkimer	6,600*	Concrete	O.	T	4,388*	Sandstone	C.&O.[3]	.....	.....	.....	.....	.....
Hornell	884*	Brick or conc.	O.	L	.....	.....	.....	.....	.....	.....	.....	.....
Hudson	2,900*	Concrete	O.	T	6,000*	Bluestone	O.	U	400*	Concrete	C.	.....
Hudson Falls	1,777*	Concrete	C.&O.[3]	T	600*	Concrete	.....	.....	.....	.....	.....	.....
Jamestown	35,000*	Concrete	O.	U	500*	Concrete	C.&O.[2]	U	500*	Concrete	C.&O.[2]	U
Kingston	985†	Concrete	C.	.....	3,181*	Concrete	C.	.....	.....	.....	.....	.....
Lestershire	1,000*	Concrete	C.&O.[2]	U	5,600*	Concrete	C.&O.[2]	U	.....	.....	.....	.....
Little Falls	7,500*	Concrete	O.	U	6,360*	Con. or sndstn	O.	A5	700*	Concrete	O.	A5
Middletown	.....	.....	.....	.....	2,000*	Stone	O.	U	2,000*	Concrete	C.	.....
Newark	5,000*	.....	.....	.....	10,000*	.....	C.&O.[3]	U	10,000*	.....	C.&O.[3]	U
New York City:												
Bronx	44,037†	Bl. stn or conc.	O.	.....	217,966*	Blstn. or gran.	O.	.....	1,542†	.....	O.	.....
Brooklyn	206,250†	Concrete	O.	U	425,000*	Conc. or blstn	O.	U	.....	.....	O.	T
Manhattan	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Richmond	113,373*	Conc. or bl. stn	O.	F & T	64,559*	Conc. or blstn	O.	F	23,363†	Vitrified brick	O.	F
Niagara Falls	5,280*	Concrete	O.	A	.....	.....	.....	.....	.....	.....	.....	.....
Norwich	6,000*	Flagstone	O.	T	14,000*	Concrete	O.	C	.....	.....	.....	.....
Ogdensburg	10,104†	Concrete	C.&O.[13]	A5	3,400*	Concrete	C.&O.[6]	A5	.....	.....	.....	.....
Poughkeepsie	35,000*	Concrete	O.	A	14,747*	Blstn or sndstn	O.	A	2,917*	Concrete	O.	A
Rochester	59,939*	Concrete	O.	A	.....	.....	.....	.....	.....	.....	.....	.....
Salamanca	10,500*	Concrete	C.	.....	1,600*	Stone	C.	.....	.....	.....	.....	.....

(For footnotes, see page 443.)

TABLE No. 5—SIDEWALKS, CURBS AND GUTTERS LAID IN 1911 (Continued)

Name of city.	Sidewalks 1. Amount laid in 1911.	2. Materials used.	3. Paid for by.	4. Method of payment.	Curbs 5. Amount laid in 1911.	6. Materials used.	7. Paid for by.	8. Method of payment.	Gutters 9. Amount laid in 1911.	10. Materials used.	11. Paid for by.	12. Method of payment.
New York (Continued):												
Schenectady	.....	.....	.....	.....	41,000*	Grnite or conc.	O.	A	.....	.....	.....	.....
Syracuse	49,157*	Concrete	O.	.....	.....	.....	.....	.....	.....	.....	.....	.....
Watertown	23,800*	Concrete	O.	T	8,530*	Concrete	O.	A5	8,530*	Concrete	O.	A5
White Plains	10,000*	Conc. or flag	O.	F	50,000*	Concrete	O.	F	10,200*	Conc. or flag	O.	F
North Carolina:												
Goldsboro	.....	.....	.....	.....	2,000*	.....	C.	.....	.....	.....	.....	.....
Greensboro	1,250*	Concrete	O.	T	5,000*	Granite	C.	.....	3,000*	Concrete	C.	.....
Monroe	6,000*	Gravel or rock	C.	.....	2,640*	Conc. or stone	C.	.....	2,640*	Concrete	C.	.....
North Dakota:												
Grand Forks	.....	.....	.....	.....	8,000*	Concrete	O.	A3	10,000*	Concrete	O.	A3
Valley City	2,850*	Concrete	O.	F or T	.....	.....	.....	.....	.....	.....	.....	.....
Ohio												
Ashland	.....	.....	O.	T	.....	.....	.....	.....	.....	.....	.....	.....
Bellefontaine	36,960*	Concrete	O.	A or T	.....	.....	.....	.....	.....	.....	.....	.....
Cambridge	6,000*	Concrete	O.	T	.....	.....	.....	.....	.....	.....	.....	.....
Canton	31,800*	Flagstone	O.	A	110,000*	Stone	O.	A	.....	.....	.....	.....
Chillicothe	5,800*	.....	O.	A or T	9,800*	.....	O.	A or T	5,900*	.....	O.	A or T
Cincinnati	159,804*	Conc. or plank	O.	U	.....	.....	.....	.....	.....	.....	.....	.....
Circleville	10,000†	Concrete	O.	T	.....	.....	.....	.....	.....	.....	.....	.....
Columbus	.....	.....	O.	J	.....	.....	.....	.....	.....	.....	.....	.....
Conneaut	4,000*	Concrete	O.	U	.....	.....	.....	.....	.....	.....	.....	.....
Defiance	.....	Concrete	O.	T	.....	.....	.....	.....	.....	.....	.....	.....
East Liverpool	.....	.....	.....	.....	22,400*	Conc. or stone	C. & O.	A	3,000*	Concrete	C. & O.	A
East Palestine	3,000*	Conc. & stone	O.	T	.....	.....	.....	.....	.....	.....	.....	.....
Fostoria	.....	.....	.....	.....	15,000*	Stone	O.	A (4.5)	.....	.....	.....	.....
Galion	5,300*	Flagging	O.	T	.....	.....	.....	.....	.....	.....	.....	.....
Hamilton	26,000†	Concrete	O.	A5 or T	11,900*	Concrete	O.	A5 or T	11,900*	Concrete	O.	A 5 or T
Lorain	19,000*	Sandstone	O.	A2	.....	.....	.....	.....	.....	.....	.....	.....
Marion	15,840*	Sandstone	O.	A5	10,542*	Sandstone	O.	A10	.....	.....	.....	.....
Massillon	4,000*	Concrete	O.	A or T	.....	Concrete	O.	A or T	1,800*	Concrete	O.	A or T
Miamisburg	5,000†	Concrete	O.	T	10,000*	Concrete	O.	T	10,000*	Concrete	O.	T
Mount Vernon	4,000*	Concrete	O.	T	200*	Sandstone	C.	.....	500*	Brick	C.	.....
Newark	13,824*	Conc. or brick	O.	T	1,600*	Concrete	O.	T	1,600*	Concrete	O.	T
Niles	16,500*	Stone or conc.	O.	T	.....	.....	.....	.....	.....	.....	.....	.....
North Yakima	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Norwood	.....	.....	.....	.....	20,000*	Concrete	C.&O.[14]	A10	20,000*	Concrete	C.&O.[14]	A10
Pomeroy	1,000†	Conc. or brick	O.	A or T	10,500*	Conc. or stone	.....	A or T	.....	.....	.....	.....
Port Clinton	2,000*	Concrete	O.	T	1,900*	Sandstone	O.	A	.....	.....	.....	.....
Sandusky	2,000†	Concrete	C.	.....	.....	.....	.....	.....	.....	.....	.....	.....
Springfield	13,705†	Concrete	O.	U	36,000*	Concrete	O.	U	36,000*	Concrete	O.	U
Warren	4,400†	Stone or conc.	O.	U	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown	100,000*	Stone or conc.	O.	A	105,468*	Stone or conc.	O.	A	.....	.....	.....	.....
Oklahoma:												
Altus	500*	Concrete	O.	T	16,000*	Concrete	O.[4]	A	16,000*	Concrete	O.[4]	A
Bartlesville	2,500*	Brick or conc.	O.	T	14,000*	Concrete	O.	A	14,000*	Concrete	O.	A
Chandler	10,000*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chickasha	2,258*	Concrete	O.	U	600*	Concrete	O.	U	.....	.....	.....	.....
Clinton	5,300*	Concrete	O.	T	.....	.....	.....	.....	.....	.....	.....	.....
Durant	4,000*	Concrete	O.	T	2,500*	Concrete	O.	T	5,500*	Concrete	O.	A10
El Reno	6,600*	Concrete	O.	U	.....	.....	.....	.....	.....	.....	.....	.....
Hugo	42,240*	Concrete	O.	R	31,020*	Concrete	O.	T	31,020*	Concrete	O.	T
Mangum	2,640*	Concrete	O.	U	200*	.....	.....	.....	.....	.....	.....	.....
Muskogee	50,000*	Concrete	O.	T	150,000*	Concrete	O.	A	150,000*	Concrete	O.	A
Perry	23.706*	Concrete	O.	U	21,118*	Concrete	O.	A	21,118*	Concrete	O.	A
Sapulpa	15,000*	Concrete	O.	A	.....	.....	.....	.....	.....	.....	.....	.....
Shawnee	21,000*	Concrete	O.	T	.....	.....	.....	.....	.....	.....	.....	.....
Oregon:												
Astoria	5,596*	Concrete	O.	P	6,405*	Concrete	O.	P	6,405*	Concrete	O.	P
Baker	9,197*	Concrete	O.	T	34,390*	Concrete	O.	A or T	.....	.....	.....	.....
Grant's Pass	8,420*	Concrete	O.	A	10,280*	Concrete	O.	A	10,032*	Concrete	O.	A
McMinnville	3,000*	Concrete	O.	U	1,000*	Concrete	O.	U	.....	.....	.....	.....
Oregon City	40,000*	Concrete	O.	A10	42,000*	Concrete	O.	A10	.....	.....	.....	.....
Portland	1,275,793*	Concrete	O.	A or T	1,375,819*	Concrete	O.	A or T	.....	.....	.....	.....
Salem	15,000†	.....	O.	U	76,365*	.....	.....	.....	.....	.....	.....	.....
The Dalles	5,620*	Concrete	O.	T	5,000*	Concrete	O.	T	.....	.....	.....	.....
Pennsylvania:												
Allentown	12,000*	Concrete	O.	T	12,000*	Concrete	O.	T	12,000*	Concrete	O.	T
Bloomsburg	800†	Concrete	O.	T	700*	Concrete	O.	T	600†	Brick	C.	.....
Carbondale	7,000*	Stone	O.	T	7,000*	Stone	O.	A	.....	.....	.....	.....
Carlisle	13,500†	Concrete	O.	T	6,000*	Concrete	O.	T	3,000*	Brick	O.	S
Clearfield	1,000*	Concrete	O.	T	.....	.....	.....	.....	.....	.....	.....	.....
Du Bois	.....	.....	O.	T	.....	.....	.....	.....	.....	.....	.....	.....
East Stroudsburg	4,000*	Concrete	O.	T	.....	.....	.....	.....	.....	.....	.....	.....
Erie	.....	.....	.....	.....	10,383*	Concrete	O.	X	.....	.....	.....	.....
Forest City	500*	Stone	O.	.....	100*	Stone	.....	.....	.....	.....	.....	.....
Franklin	.....	.....	.....	.....	3,000*	Sandstone	O.	F or T	.....	.....	.....	.....
Harrisburg	.....	.....	O.	T	.....	.....	O.	T	.....	.....	O.	T
Hazleton	10,500†	Tar or conc.	O.	T	1,838*	Stone or conc.	O.	T	6,000*	Stone	O.	T
Indiana	8,000*	.....	O.	T	20,750*	Concrete	O.	F	.....	.....	.....	.....
Hollidaysburg	2,800*	Concrete	O.	U	1,200*	Concrete	O.	U	.....	.....	.....	.....
Jermyn	500*	Stone or conc.	.....	.....	14,917*	Concrete	.....	.....	.....	.....	.....	.....
Kingston	15,000*	Concrete	O.	T	16,000*	Concrete	O.	S	1,000†	Brick	O.	S
McKeesport	6,542*	Brick or conc.	O.	T	.....	.....	.....	.....	.....	.....	.....	.....
Meadville	4,000*	Conc. or stone	O.	T	.....	.....	.....	.....	.....	.....	.....	.....
Mechanicsburg	3,000†	Concrete	O.	T	2,200*	Concrete	O.	T	.....	.....	.....	.....
Mercer	1,200*	Flagstone	O.	U	.....	.....	.....	.....	.....	.....	.....	.....
Meyersdale	980*	Brick or conc.	O.	U	980*	Brick. or conc.	O.	U	.....	.....	.....	.....
Nazareth	1,400*	Concrete	O.	T	150*	Concrete	O.	T	150*	Concrete	O.	T
Northumberland	3,330*	Concrete	O.	U	300*	Concrete	O.	U	300*	Concrete	O.	U
Old Forge	11,000*	Stone or conc.	O.	T	18,500*	Concrete	O.	T	.....	.....	.....	.....
Pittsburgh	1,520*	Concrete	C.	.....	97,800*	Conc., granite or sandstone	O.	U	.....	.....	.....	.....
Plymouth	10,000†	Concrete	O.	T	.....	.....	.....	.....	.....	.....	.....	.....
Pottstown	.....	.....	O.	T	.....	.....	O.	T	.....	.....	C.	.....
Punxsutawney	2,600*	Concrete	O.	U	.....	.....	.....	.....	.....	.....	.....	.....
Rankin	3,400*	Brick or conc.	O.	T	3,500*	Stone or conc.	C.&O.[3]	S	.....	.....	.....	.....
Sayre	3,962*	Concrete	C.&O.[10]	J	3,962*	Concrete	C.&O.[3]	J	3,962*	Concrete	C.&O.[3]	J
Scranton	16,050*	Flagstone	O.	A	39,120*	Concrete	O.	A	.....	.....	.....	.....
South Bethlehem	.....	.....	O.	T	.....	.....	.....	.....	.....	.....	.....	.....
Titusville	14,520*	Concrete	O.	T	.....	.....	.....	.....	.....	.....	.....	.....
West Hazleton	89,400*	Concrete	O.	T	2,000*	Concrete	O.	T	1,500*	Stone	O.	T
Wilkes-Barre	13,000*	Flagstone	O.	T	38,572*	Stone or conc.	O.	X	.....	.....	.....	.....
Wilkinsburg	5,000*	Concrete	O.	T	11,300*	Concrete	C.&O.[3]	.....	11,300*	Concrete	C.&O.[3]	.....
Williamsport	.....	.....	O.	T	.....	.....	O.	T	.....	.....	.....	.....
York	16,000*	Concrete	O.	T	19,000*	Concrete	O.	T	15,000*	Concrete	O.	T

(For footnotes, see page 443.)

TABLE No. 5—SIDEWALKS, CURBS AND GUTTERS LAID IN 1911 (Continued)

Name of city.	Sidewalks 1. Amount laid in 1911.	2. Materials used.	3. Paid for by.	4. Method of payment.	Curbs 5. Amount laid in 1911.	6. Materials used	7. Paid for by.	8. Method of payment.	Gutters 9. Amount laid in 1911.	10. Materials used.	11. Paid for by.	12. Method of payment.
Rhode Island:												
East Providence	12,800*	Tar concrete	O.	S or T	.....	.....	.....	.....	.....	.....	.....	.....
Newport	10,925*	Granolithic	C.	.....	4,480*	Granite	C.	.....	4,760*	Granite	C.	.....
Pawtucket	.....	.....	.....	.....	8,080*	Granite	C. & O.	.....	2,700†	Cobble	C.	.....
Providence	8,785*	Tar concrete	O.	R	34,906*	Granite	O.	R	32,000*	Cobble	C.	.....
Woonsocket	1,978*	Tar concrete	C. & O.[2]	.....	4,873*	Granite	O.	.....	7,160*	Cobble	C.	.....
South Carolina:												
Charleston	7,051†	Blstn or conc.	C.	.....	18,671*	Granite	C.	.....	.....	.....	.....	.....
Columbia	.....	.....	.....	.....	6,676*	Concrete	C. & O.	T	.....	.....	.....	.....
Greenville	4,000*	Concrete	C. & O.[2]	A5	8,876*	Granite	C. & O.[2]	A5	7,187*	Gran. blk. or concrete	C. & O.[2]	A5
South Dakota:												
Aberdeen	5,500*	Concrete	O.	.....	5,500*	Concrete	O.	.....	.....	.....	.....	.....
Deadwood	600†	.....	O.	.....	1,000*	.....	.....	.....	.....	.....	.....	.....
Huron	.....	.....	O.	T	.....	.....	.....	.....	.....	.....	.....	.....
Mitchell	7,580*	Concrete	O.	U	1,300*	Concrete	O.	U	.....	.....	.....	.....
Pierre	5,000*	Concrete	C. & O.	U	1,000*	Concrete	O.	U	1,000*	Concrete	O.	U
Rapid City	5,000*	Concrete	O.	U	2,000*	Concrete	O.	U	.....	.....	.....	.....
Sioux Falls	26,400*	Concrete	O.	T or U	9,600*	.....	O.	T or U	11,000*	.....	O.	T or U
Yankton	1,453*	Concrete	O.	T or F	1,085*	Concrete	O.	T or F	1,085*	Concrete	O.	T or F
Tennessee:												
Knoxville	21,348*	Concrete	O.	T	43,970*	Limestone or concrete	C. and O.[11,9,4]	T & A	24,867*	Limestone or concrete	C. & O.[11]	T
Texas:												
Austin	22,753*	Concrete	O.	T	23,104*	Conc. or stone	O.	T	.....	.....	.....	.....
Dallas	25,000*	Concrete	O.	.....	212,077*	Concrete	O.	.....	128,179*	Concrete	O	.....
Greenville	.....	Concrete	O.	M	.....	.....	.....	.....	.....	.....	.....	.....
Laredo	700*	Concrete	O.	T	.....	.....	.....	.....	.....	.....	.....	.....
Mineral Wells	5,000*	Concrete	O.	T	3,000*	Concrete	O.	T	1,500*	Concrete	O.	T
Paris	26,400*	Concrete	O.	U	19,080*	Concrete	C.	.....	17,000*	.....	.....	.....
San Angelo	7,000*	Concrete	O.	T	10,000*	Concrete	O.	T	5,000*	Concrete	O.	Y
San Antonio	.....	.....	O.	T	.....	.....	.....	.....	.....	.....	.....	.....
Tyler	3,300*	Concrete	O.[4]	T	.....	.....	.....	.....	.....	.....	.....	.....
Utah:												
Ogden	25,257*	Concrete	O.	A	19,462*	Concrete	O.	A	19,462*	Concrete	O.	A
Salt Lake City	222.654*	Concrete	O.	A or T	31,264*	Concrete	O.	A	31,077*	Concrete	O.	A
Vermont:												
St. Albans	1,414†	Concrete	C.	.....	3,318*	Concrete	C.	.....	.....	.....	.....	.....
Virginia:												
Covington	500†	Concrete	C. & O.[2]	.....	900*	.....	.....	.....	.....	.....	.....	.....
Danville	11,200*	Granolithic	C.	.....	4,700*	Granite	C.	.....	4,700*	Stone block	C.	.....
Farmville	235*	Concrete	C.	.....	537*	Concrete	C.	.....	1,320*	Concrete	C.	.....
Fredericksburg	400†	Granolithic	C. & O.[3]	.....	3,000*	Granolithic	.....	.....	500†	Granolithic	.....	.....
Newport News	5,200*	Concrete	O.	T	6,440*	Concrete	.....	.....	6,440*	Concrete	.....	.....
Portsmouth	790†	.....	.....	.....	5,500*	Gran. or blstn.	.....	.....	.....	.....	.....	.....
Suffolk	2,370*	Granolithic	C. & O.[10]	.....	.....	.....	.....	.....	.....	.....	.....	.....
Washington:												
Aberdeen	29,104‡	.....	O.	.....	31,901*	.....	O.	.....	31,901*	.....	O.	.....
Colfax	2,400†	Concrete	O.	T	7,500*	Concrete	O.	A	.....	.....	.....	.....
Dayton	6,480*	Concrete	O.	A	6,500*	Concrete	.....	.....	.....	.....	.....	.....
Everett	72,900*	Concrete	O.	A	55,800†	Concrete	O.	A	77,983*	Brk., conc. or plank.	O.	A
North Yakima	53,000†	Concrete	.....	.....	27,000*	Concrete	.....	.....	.....	.....	.....	.....
Seattle	352,862*	Wood or conc.	C. & O.	C	828,449*	Gran., conc. or wood	C. & O.	C	.....	.....	.....	.....
Snohomish	6,100†	Concrete	O.	T	.....	.....	.....	.....	.....	.....	.....	.....
Spokane	447,834*	Concrete	O.	A	403,920*	Concrete	O.	A	42,240*	Concrete	O.	A
Tacoma	106,174*	Concrete	O.	A5 or T	.....	.....	.....	.....	.....	.....	.....	.....
Vancouver	69,415†	Concrete	O.	A or T	91,010*	Concrete	O.	A. or T	.....	.....	.....	.....
Walla Walla	25,925*	Concrete	O.	T	.....	.....	.....	.....	.....	.....	.....	.....
West Virginia:												
Follansbee	.....	.....	.....	.....	3,500*	Concrete	O.	A	.....	.....	.....	.....
Moundsville	3,000*	Concrete	O.	U	.....	.....	.....	.....	.....	.....	.....	.....
Point Pleasant	8,000*	Concrete	O.	A	8,000*	Concrete	C.	.....	8,000*	Concrete	C.	.....
Wisconsin:												
Antigo	6,700*	Concrete	O.	U	5,400*	Concrete	C. & O.[3]	U	5,400*	Concrete	C. & O.[3]	U
Appleton	46,595*	Concrete	O.	U	16,622*	Stone or conc.	O.[4]	U	15,343*	Stone or conc.	O.[4]	U
Barabooo	11,000*	Gravel	O.	T	.....	.....	.....	.....	.....	.....	.....	.....
Beloit	15,000*	Concrete	O.	U	.....	.....	.....	.....	.....	.....	.....	.....
Burlington	9,510*	Concrete	O.	T	8,800*	Concrete	O.	T	4,520*	Concrete	O.	T
Columbus	2,600*	Concrete	O.	T	4,000*	Concrete	C. & O.[8]	A	4,000*	Concrete	C. & O.[8]	A
Fond du Lac	.....	Concrete	O.	U	.....	Concrete	O.	A5	.....	Concrete	O.	A5
Janesville	.....	.....	O.	T or F	20,000*	.....	O.	T or F	20,000*	.....	O.	T or F
Kenosha	8,000†	.....	O.	U	10,000*	.....	.....	.....	10,000*	.....	.....	.....
Marinette	15,840*	Concrete	O.	A5	3,800*	Concrete	O.	A5	3,800*	Concrete	O.	A5
Merrill	13,700*	Concrete	O.	T	1,590*	Concrete	C. & O.[3]	R	1,590*	Concrete	C. & O.[3]	R
Neenah	.....	.....	.....	.....	960*	.....	O.	T	960*	.....	O.	T
Oconto	10,280*	Concrete	O.	U	1,200*	Concrete	O.	U	1,200*	Concrete	O.	U
Oshkosh	.....	Concrete	O.	A	.....	.....	.....	.....	.....	.....	.....	.....
Superior	64,333*	Conc. or wood	O.	U	.....	.....	.....	.....	.....	.....	.....	.....
Waukesha	6,733†	Concrete	O.	T	3,993*	Concrete	O.	T	3,993*	Concrete	O.	F
Wyoming:												
Cheyenne	10,370*	Concrete	O.	T	.....	.....	.....	.....	.....	.....	.....	.....

[1] Large amount in addition laid by private contract. [3] City pays ½ and owner ½. [3] City pays ⅓, owner ⅔. [4] City pays for corners at street intersections. [5] City pays owner rebate of 5c. per sq. ft. for concrete, or lays brick furnished by owner. [6] Owner pays 90 per cent., city 10 per cent. [7] City pays 2c. per sq. ft., owner the balance. [8] City pays 20 per cent., owner 80 per cent. [9] Owner pays 20c. per lineal foot for curb and gutter, city the balance. [10] City pays ⅔, owners ⅓. [11] 10c. per foot rebated by village. [12] City pays 60 per cent., owner 40 per cent. [13] City pays ¼, owner ¾. [14] City pays 2 per cent. owner 98 per cent.

NOTE.—In columns 1, 5 and 9, (†) stands for square yards; (*) for lineal feet. In columns 3, 7 and 11, C stands for city and O for abutting owner. In columns 4, 8 and 12 the letters have the following significance: A—Annual insallments to city; or cash if desired; number of installments, if reported, indicated by numerals; rate of interest indicated by numeral in parentheses, as A5 (6) means five annual installments and interest at 6 per cent. B—Same as A, but contractors paid with bonds, which are taken up by the installment payments, as they are collected. C—Optional installments. D—Annual installments paid to contractor, secured by first lien certificates against the property. E—Ten annual installments with 6 per cent. interest, or cash with 5 per cent. discount. F—Assessed against property. G—Lien against property to run three years with interest. H—Cash, or interest charged from date of completion (rate of interest charged indicated by numeral in parentheses). I—By two payments made within twelve months. J—Within 30 days. K—In advance. L—Cash, or with next tax payment. M—One-third cash, balance in two annual installments. N—One-fourth cash, balance in three annual installments. O—One-fifth cash, balance in annual installments. P—60 per cent. in cash, 40 per cent. by installments. Q—13 per cent in cash, 87 per cent by installments. R—Tax bills against property (payable in number of days indicated by numeral) S—City collects from owner; method not stated. T—By property owners, by private contract. U—Cash to city. V—By four payments made within twelve months. W—Interest bearing coupon warrants, 5 to 8 years. X—Semi-annual installments. Y—One-half cash, balance in three annual installments.

(Continued from page 434.)

owner paying for the balance. In 7 cases the city pays one-third and the owner two-thirds. In two cases the city pays two-thirds and the owner one-third. And there is one instance of each of the following: City pays the owner a rebate of 5 cents per square foot for a cement sidewalk, or lays the brick when it is furnished by the owner. City pays 2 cents per square foot and the owner the balance. City pays one-fifth and the owner four-fifths. City pays one-fourth and the owner three-fourths.

In endeavoring to classify the methods of paying, some difficulty was encountered owing to our inability in several cases to exactly understand the description given and to the somewhat complicated procedure. So far as we were able to fully understand the several methods, we have classified them with the following results: In 178 cases the sidewalk is laid by the owner by direct arrangement with the contractor, the city having nothing to do with it, except in some cases to order the construction of the sidewalk where necessary. In most cities it is provided that it the property owner does not lay the sidewalk within a certain time after being directed to do so, it will be constructed by the city, and the amount collected from the owner in one of the following ways: In 84 cities the owner pays the amount in several annual installments to the city, in some cases paying interest on the amount due and in other cases no interest apparently being charged. We presume that in most, if not all, cities cash can be paid if the owner desires. In 5 cases it is stated that the contractors are paid with paving bonds, and that these are taken up as the installments are paid for this purpose. In 71 cases the owner pays cash to the city. In 15 cases it was stated that the amount due was assessed against the property, but the method of collection was not explained. In 5 cases the amount is to be paid within 30 days. In 4 cases it is paid by installments, the number being optional with the property owner. In 3 cases cash is paid or the amount is added to the next tax bill. There were 2 instances of each of the following: A lien against the property to run three years with interest; two payments made within 12 months; cash in advance on making application for construction; one-third cash, the balance in two annual installments; one-fourth cash, the balance in three annual installments; 60 per cent. cash, 40 per cent. in installments; interest bearing coupon warrants running 5 to 8 years. There was one instance of each of the following methods: Annual installments paid to the contractor, which are secured by a first lien certificate against the property; interest charged from the date of completion; one-fifth cash and the balance in annual installments; ten semi-annual installments.

The number of annual installments was 10 in sixteen cases, 5 in ten cases, 7 in six cases, 3 in five cases, 2 in four cases, 1 in two cases, 8 in two cases, 6 in one case and 16 in one case. One calls for payment in 60 days, six for payment in 30 days.

In the case of curbs these were paid for by the owner in 215 out of 295 cases, and by the city in 21 cases. They were paid for partly by one and partly by the other in 59 cases, the distribution of payments being as follows: In 16 cases the city pays for corners at street intersections and the property owner for the balance. In 15 cases the city and the property owner each pay one-half. In 11 cases the city pays one-third and the owner two-thirds (we suspect that in some cases reported in this way the total cost of street paving and curb is levied in this way, in which case each owner pays one-third of *both* curbs, really paying two-thirds of his own curb). In 3 cases the city pays one-fifth and the owner four-fifths. In 2 cases the owner pays 90 per cent. and the city 10 per cent. There was one case each of the following: Owner pays 20 cents per lineal foot for curb and gutter and the city the balance. City pays two-thirds and the owner one-third. Ten cents per foot rebate paid by the village. City pays 60 per cent., owner 40 per cent. City pays 2 per cent., owner 98 per cent. In 7 instances the method of distributing the cost was not given.

In paying for the curbs only 78 cities report these as being built by the owner without the interposition of the city. In 100 cases the city was repaid by annual installments; in 44 cases by cash; in 17 cases the amount was assessed against the property; in 11 cases it was added to the tax bill against the property; in 8 cases the city collects from the owner by a method not stated; in 6 cases the payment is made by installments, the number of which is optional with the owner; in 2 cases payment is made within 30 days and in 2 others by semi-annual installments. There was one instance of each of the following: Interest charged from date of completion; two payments made within 12 months; one-third cash, balance in two annual installments; 60 per cent. in cash, 40 per cent. by installments; 13 per cent. in cash, 87 per cent. by installments; interest bearing coupon warrants, 5 to 8 years. The number of annual installments for curbs was 10 in eight cases, 5 in eleven cases, 7 in seven cases, 8 in two cases, 3 in two cases and 16 in one case; while in one case payment was made in 60 days and in another case in 30 days. The rate of interest charged was 6 per cent. in five cases, 7 per cent. in one case and 4½ per cent. in another.

Of the 186 cities which reported concerning payments for gutters, the city pays the entire cost in 40, the owner the entire cost in 116, and in 30 both pay according to several ratios. In 8 cases the city pays for the corners at street intersections and the property owner for the balance. In 6 cases the city pays one-third and the owner two-thirds, and in 5 cases the city pays one-half and the owner one-half. In 2 cases the city pays one-fifth and the owner four-fifths, and there is one case of each of the following: Owner pays 90 per cent., city 10 per cent.; owner pays 20 cents per lineal foot for curb and gutter, city the balance; 10 cents per lineal foot rebated by the village for curb and gutter; city pays 60 per cent., owner 40 per cent.; city pays 2 per cent., owner 98 per cent. In 4 cases the ratio paid by each was not stated.

Of the 148 statements of methods by which the property owner pays for the gutters, 42 state that the gutter is constructed by private contract by the owner; in 63 cases the payments are made by annual installments. In 18 cases the city is paid in cash; in 8 cases the amount is assessed against the property; in 3 cases the amount is added to the tax bills against the property; in 2 cases the amount is paid in installments, the number being optional with the owner; in 2 others it is paid in two payments within twelve months, and in 2 others payment is made within 30 days. There is also one case of each of the following methods: Ten annual installments with 6 per cent. interest, or cash with 5 per cent. discount; cash or interest charged from date of completion; 60 per cent. in cash and 40 per cent. by installments; 13 per cent. in cash, 87 per cent. by installments; one-half in cash, the balance in three annual installments. In three cases the city collects from the owner by a method not stated. In fifteen cases the number of annual installments provided for is 10; in eight cases 5 annual installments are provided for; in six cases 7 installments; in one case 3 installments and in another 16 installments. The interest charged is stated in only four cases, being 6 per cent. in three of those and 7 per cent. in the fourth.

In a number of States acts have been passed providing quite definitely the methods by which payments for street paving, sidewalks, curbs and gutters shall be made. In Indiana an act passed in 1905 provides as follows:

Whenever the Board of Public Works shall order the improvement of any street or alley, as provided in the preceding sections, the assessment for said improvement may, at the option of each property holder, be payable in ten annual installments, as follows: Ten per cent. of the principal, together with all accrued interest on the entire assessment on or before the first

Monday of May next succeeding the allowance of the final estimate on such work by said board, except where such estimate has been made between February 15 and October 1 of any year, in which case such first installment shall be payable on the first Monday of November next succeeding such estimate. The next payment on said assessment shall be six months' interest on the unpaid principal, payable at the date of the general payment of taxes, either spring or fall, as the case may be, next after the first installment on such assessments falls due. The next payment of said assessment shall be 10 per cent. of the original principal and six months' interest on the unpaid principal, payable on or before the date for the general payment of taxes, spring or fall, as the case may be, accruing one year after the first instaliment was payable and so on thereafter, 10 per cent. of the original principal and six months' interest on the unpaid principal once each year and six months' interest in alternate turn with each annual payment of principal and interest until the entire principal and interest have been paid. Interest not exceeding 6 per cent. per annum shall be specified by said board in the resolution for improvements, and shall commence from the date of allowance of such final estimate.

(For the above we are indebted to H. C. McCluer, city engineer of Crawfordsville.)

In Kentucky (for a copy of the laws of which State bearing on this subject we are indebted to L. A. Washington, city engineer of Paducah) the exact procedure has been fixed by statute. Provision is made for not only original construction, but also for resurfacing upon a foundation already in place. "The improvement of public highways and sidewalks (including curbing and guttering), except as hereinafter provided, shall be made at the exclusive cost of the owners of real estate abutting on such improvement," the cost being distributed according to the number of front feet. The exceptions to full payment by the owner are street intersections, which are paid for by the city so far as the roadway pavement is concerned, although sidewalks, curbing and guttering are apportioned against the owners of the property abutting on the side of the street on which the improvement is made, each corner lot having its sidewalk intersection included in its frontage; also strips along and adjacent to street railway tracks are assessed against the railroad as provided in their franchises. Where the assessment would exceed one-half of the value of the lot the assessment is limited to this one-half value and the balance is paid out of tne general fund. "The general council of any city of the second class may provide by general ordinance that such city shall pay part, and if so, what part, of the cost of the improvement of the streets, alleys and other public ways (excluding sidewalks) of such city." We understand from this that the cost of sidewalks must in every case be paid by the property owners.

This assessment may be paid in ten annual installments, practically as provided for in the Indiana statute just quoted, providing the owner arrange for this with the city within thirty days. Otherwise it is levied as an ordinary tax and is due upon the completion of the work, and if not paid within 30 days a penalty of 10 per cent. of the amount of the tax is added. A lien is placed on the property for the amount of the tax and this bears 6 per cent. interest from the time of the assessment until paid.

In making the ten annual payments, the first installment, with interest on the entire tax, is paid at the time fixed by law for the payment of general city taxes occurring next after the expiration of 30 days allowed for payment in cash, and annually thereafter at the same date, semi-annual interest being paid in addition six months after each of such annual payments. The installments due and the interest are placed upon the tax duplicate with the other taxes, and are collected with them. If an installment remains unpaid for one month after it is due, a penalty of 10 per cent. of the installment in arrears is added.

Should it desire, the general council of the city may provide for payments in any number of years other than, but not exceeding, ten.

In paying the contractor, council may, if it wish, issue to the contractor improvement warrants for the monthly estimate less 35 per cent., these warrants bearing interest not to exceed 6 per cent. from the date of issue. These are negotiable and constitute a lien on the local taxes levied for the improvement, and the interest on these warrants is included in the cost of the improvement which is assessed on the property. In order to provide a fund for the payment for street improvements, the council may issue improvement bonds in anticipation of the collection of the taxes, pledging the taxes and the liens on the property improved for the payment of the principal and interest of the bonds.

This act provides that should owners of more than 50 per cent. of the abutting property petition for the use of a certain material for the improvement in front of their property, this material must be used unless an ordinance be passed by a two-thirds vote of the members elect of the council specifying some other material. Unless such petition is presented, the kind of material to be used is decided by vote of council.

Such regulations are not found in all States, however, and in New Hampshire improvement assessments are declared unconstitutional and the city pays the entire cost of sidewalks, curbs and gutters unless the abutters offer to assume a part or the whole of such expense.

SHADE TREES ON HIGHWAYS

Rights and Powers of City and Abutting Owner Respectively in Them—Court Decisions in a Number of States

Where the Municipality Owns the Fee.—Where the shade trees in the public streets are the property of the municipality, it has complete control over them and may cut them down and reserve them when they threaten to become permanent obstructions, 155 Ill., 37, and regulate their use even against the adjoining owner, who has planted them, as by passing an ordinance prohibiting the hitching of any horse to shade trees in the street.—Baker v. Town of Normal, 81 Ill., 108.

Where the Abutting Owner Owns the Fee.—When the fee of the sidewalks and streets is vested in the abutting owners, subject to the municipality's easement for public uses, the shade trees upon the margins of the sidewalks are the property of the lot owners. Even when this is the case, it is within the power of the municipality to remove the trees as obstructions, should the public necessity or convenience so require.—Scott v. Marshall, 110 Mo. App. 178; Hildrup v. Town of Windfall City, 29 Ind. App. 592.

Municipality Cannot Act Arbitrarily.—But the municipality cannot do so in an arbitrary or capricious manner when it is clearly apparent that no such necessity or convenience exists. An illustration of such an attempted arbitrary removal is found in a case where it was proposed to remove the shade trees and leave standing a great many telegraph, telephone and trolley poles, which constituted as much of an obstruction to the street as the trees.—City of Atlanta v. Holliday; Cartwright v. Liberty Telephone Co., 205 Mo., 126; Everett v. Council Bluffs, 46 Iowa, 66; Frostburg v. Wineland, 98 Md., 239. A statute giving the park commissioners of a city power to cause the removal of trees in streets whenever required for the public convenience does not authorize them to remove the trees arbitrarily.—Ellison v. Allen, 30 N. Y. Supp. 441. While admitting the principle that the city may not arbitrarily destroy or remove an abutting owner's shade trees, it has been held that where it duly adopts a plan for the improvement of the street by grading or otherwise, and the execution of the plan necessarily requires the destruction of the trees, their removal in the prosecution of the work affords no cause of action to the lot owner.—Kemp v. City of Des Moines, 125 Iowa, 640. To obtain an injunction against the city to prevent such a grading on the

ground that destruction of shade trees would result, the lot owner would be required to show that the work involved an unreasonable change in the street, or would produce unnecessary injury to his rights.—Gallaher v. City of Jefferson, 125 Iowa, 324. It has even been held that where the municipality, under its charter is given the general care, custody and control of the streets, and the duty is thus imposed upon it to cause the removal of anything constituting an obstruction to the streets and sidewalks, its determination to remove shade trees set out on the sidewalk by an abutting owner, in the absence of fraud or oppression, or circumstances disclosing a manifest abuse of its discretion, is conclusive and not open to question by the courts.—Vanderhurst v. Tholcke, 113 Cal., 147. And it has also been held that it is not necessary in order that they should constitute an obstruction, that they should interfere with or stop travel.—Chase v. City of Oshkosh, 81 Wis., 313. On the other hand, it has been held that such a power is only a police ministerial power to prevent and relieve the public from such obstructions in the use of the streets as are apparent or readily ascertainable without the necessity of any adjudication and does not authorize the summary removal of growing trees without notice to the owner.—Avis v. Vineland, 56 N. J. L., 474; Dilts v. Stockton, 73, N. J. L., 158. And a municipality which exercises its right to cut down shade trees belonging to an abutting owner without first giving such owner notice that public necessity requires their removal, so that he might transplant or remove them himself, has been held liable to the owner in trespass.—Stretch v. Village of Cassopolis, 125 Mich., 167. In Massachusetts the protection of shade trees from destruction has been regulated by successive statutes. A highway surveyor or other person has no power summarily to cut down shade trees in the highway, but must proceed to obtain from the proper tribunal an adjudication that they shall be removed.—White v. Godfrey, 97 Mass., 472; Bliss v. Bull, 99 Mass., 597; Chase v. Lowell, 149 Mass., 85. Where a statute providing for the planting by abutting owners of shade trees in front of their premises has been repealed by a statute which declares that the repeal shall not affect any act done or right acquired under the repealed statute prior to the taking effect of the repealing statute, this saving clause will protect the abutting owner as against the public and public officers, and secure to him the right to the continuance of the growth of shade trees in front of his premises. He may maintain trespass for their destruction and the measure of his damages will be the difference between the value of the premises before and after the trees were cut.—Edsall v. Howell, 86 Hun. (N. Y.), 424. In Town of La Grange v. Overstreet (Ky.), 132 S. W., 169, the question was decided on the suitability of the tree removed (which was a locust tree), as a shade tree. It was held that the court might take judicial notice that locust trees do not make desirable or attractive shade trees, and decided that the board of trustees of the town under their statutory powers to remove obstructions in the streets, etc., was authorized to order the removal of such a tree standing on the sidewalk, it not appearing that the board acted arbitrarily in the matter. The question of the power of the board to remove an attractive and suitable shade tree, which did not impede travel in the street was, it was held, not presented to the court. The different conclusions reached by the various courts, it was said in Paula v. Wentz, 79 Kan. 148, may be accounted for in part by differences in local statutes. It was said that even assuming that the question of the removal of shade trees was one for the determination of city officers, not subject to review by the courts, any arbitrary and unfair action on their part might be enjoined as an abuse of discretion. They could not, against the abutting owners' objection, remove a shade tree in order to place a sidewalk in a position different from that prescribed by ordinance. In Frostburg v. Wineland, 98 Md., 239, it was held that shade trees growing in a street are not a nuisance per se and only become so when they obstruct or interfere with the use of the street. Unless they do so, a municipality is not authorized to remove them under its general power to pave streets and abate nuisances.

Private Individual's Right to Remove Trees.—No private individual, not acting under official authority, is justified in destroying shade trees, unless, it has been held, they are such an obstruction as to be a hindrance or annoyance to travelers and so constitute a public nuisance, which, of necessity, is a question in every case to be decided by a jury.—Phifer v. Cox, 21 Ohio St., 248. In Lovejoy v. Campbell (S. D.) 92 N. W., 24, it was held that even when the fee of the street is in the municipality, the abutting owner, who has planted and cared for trees standing in the street in front of his premises, may recover damages for injuries thereto by persons using the street.

Authority to Trim Trees for Electric Wires.—Under statutory powers authorizing a municipality to regulate the planting, trimming and preserving of shade trees in the streets, the municipality may enact ordinances to determine the manner in which the shade and ornamental trees in the public streets shall be cut or trimmed for the purpose of regulating the running of electric wires through such streets and an ordinance which provided that before such trees should be cut down or the branches cut off the consent of the municipal authorities should be obtained has been held to be reasonable in its provisions.—Consolidated Traction Co. v. East Orange, 61 N. J. L., 202. And a public service corporation, such as a telephone company, has no right, for the accommodation of its poles and wires, to mutilate, damage or destroy shade or ornamental trees growing in a public street, unless it has obtained that authority, generally or specially, from the municipality, and even then only when the grant of authority is in harmony with, and recognizes the right and interest of, the abutting property owner in and to the trees.—Cartwright v. Liberty Telephone Co., 205, Mo. 126.

Abutting Owner's Right to Remove Trees.—Where the soil of the street belongs to the abutting owner, the trees standing thereon are his property, and he may remove them at his pleasure. Laws inflicting penalties for the destruction of such trees apply only to other persons than the owner; he is subject to no penalty for their removal, unless the public have acquired title by purchase or the exercise of the right of eminent domain. But except as authorized by statute, the owner of land subject to a public highway cannot plant trees thereon without the risk of their removal by the public authorities as being dangerous to, or interfering with, the public use.—Village of Lancaster v. Richardson, 4 (Lans.), N. Y., 136.

Line Trees.—In a case where a tree stood on the line and partly on the street and partly on an abutting owner's property, it was held that the principle of law which would control the liability of a lot owner for cutting a tree standing on the line between him and an adjoining proprietor would not be applicable to a street commissioner who was required by a reasonable necessity to hew to the line in the construction of a sidewalk and invested with statutory authority "to remove any obstacle which obstructs or is likely to obstruct a way, or render its passage dangerous." If three inches of a large tree extended outside of the limits of the street, and all of it within the location were removed, it was plain that the liability of the tree to fall across the street would be a constant menace to public travel, and it would be impracticable to distinguish such a case from the situation where one-half or a different proportion of the tree might be outside of the location. In such circumstances the street commissioner was not necessarily liable in trespass for cutting the whole of the tree, if reasonable necessity required it.—Wilson v. Simmons, 89 Me., 242.

Municipal Journal
and Engineer

Published Weekly at
50 Union Square (Fourth Ave. and 17th St.), New York
By Municipal Journal and Engineer, Inc.
Telephone, 2805 Stuyvesant, New York.
Western Office, 1441 Monadnock Block, Chicago

S. W. HUME, President
J. T. MORRIS, Manager. A. PRESCOTT FOLWELL, Secretary
A. PRESCOTT FOLWELL, Editor
F. E. PUFFER, Assistant Editor

SUBSCRIPTION RATES

United States and possessions, Mexico, Cuba...$3.00 per year
All other countries..... 4.00 per year
Entered as second-class matter, January 3, 1906, at the Post Office at New York, N. Y., under the Act of Congress of March 3, 1879.

CHANGE OF ADDRESS

Subscribers are requested to notify us of changes of address, giving both old and new addresses.

Contributions suitable for this paper, either in the form of special articles or of letters discussing municipal matters, are invited and paid for.

Subscribers desiring information concerning municipal matters are requested to call upon MUNICIPAL JOURNAL, which has unusual facilities for furnishing the same, and will do so gladly and without cost.

MARCH 21, 1912.

CONTENTS

Concrete Paving in Eight Cities. (Illustrated.) 415
Kansas City, Mo. By Clark R. Mandigo 415
Marshalltown, Iowa. By W. H. Steiner 417
Liberty, Mo. By E. H. Collins 417
Bozeman, Mont. By Carl C. Widener 418
Bemidji, Minn. By W. M. Everts 419
Sioux City, Iowa. By Keyes C. Gaynor 420
Appleton, Wis. By C. H. Vinal 422
Greenville, Ill. By H. N. Baumberger 422
Prepared Filler Macadam. (Illustrated.) 424
Selection of Pavements 425
Paving in 1911 and 1912 426
Sidewalks, Curbs and Gutters 434
Shade Trees on Highways 445
Concrete Pavements 447
Abrasion Tests of Brick 448
Wood Block Paving in Australia 448
News of the Municipalities. (Illustrated.) 449
Legal News—A Summary and Notes of Recent Decisions 459
News of the Societies 460
Personals 461
Municipal Appliances. (Illustrated.) 462
Industrial News 464
Patent Claims. (Illustrated.) 464
The Week's Contract News 465

Concrete Pavements

A YEAR ago in our special paving number a considerable part of the issue was given over to a discussion of wood block pavements, chiefly because of the controversies which were at that time being engaged in between engineers and experts concerning details of treating wood blocks, and, to a minor extent, of laying them. This year we have selected concrete for special consideration, not because this material has led in amount constructed, although the amount laid was four or five times that constructed in 1910, according to our figures, but especially because there seems to be no unanimity as to methods of construction, and it seemed desirable that all those interested should be informed of what the others were doing as the first step towards standardizing certain of the methods. With about one-half of the cities and towns of the country reporting, our figures show about 1,500,000 square yards of concrete laid, and we therefore assume that approximately 2,500,000 to 3,000,000 square yards were laid throughout the country. A considerable percentage of this was laid by the Hassam and Blome companies under their patents, all of which was classed under "concrete," as that is essentially what they are, and because in a number of cases it was not stated which, if either, of these companies laid the pavements reported as concrete, so that no correct differentiation between them could be made. So far as the pavements laid by these two companies is concerned, they may be said to be standardized in accordance with their respective methods.

A great many of the cities, however, have been laying concrete pavements themselves, or having them laid by local contractors under city specifications, and among these there is considerable variation of practice. Perhaps the most vital difference is in the use of one or two layers or coats, it appearing as though the majority of cities were constructing the pavement with a base topped with a 1½-inch or 2-inch wearing surface, while a considerable minority make the entire pavement in one course, producing a comparatively smooth surface by tamping the fine material to the top and finishing it with floats. The arguments of the latter are that a thin wearing coat frequently does not bond perfectly with the base, and spalls off sooner or later; also, that the two-coat work is more expensive than the one coat. The advocates of the two-coat pavement claim, however, that if the wearing surface be laid immediately upon the base, and be well compacted and worked, the bond between the two will be all that is desired, and that it is possible to obtain a more uniform surface with this construction than with the one-course pavement.

Another difference of opinion is in the matter of expansion joints; and here it may be said that few, if any, engineers are satisfied with their own practice, although many mantain that theirs is better than any of the others with which they are familiar. The majority appear to use transverse expansion joints at intervals of 15 to 50 feet, although a few use no expansion joints whatever. In some instances one or more longitudinal joints are run lengthwise of the street, but in the majority of cases it seems to be the opinion of the engineers that these invite rutting by wheels. The objection offered to transverse joints is that the edges of these soon chip off, and the jarring and pounding of passing vehicles and horses gradually increases this chipping until an unsightly and jolting depression is formed entirely across the pavement at each expansion joint. On the other hand, it is maintained that if these transverse joints are not left in the pavement, the pavement will contract in cold weather and make its own joints, and that these will be irregular and unsightly, and will ultimately be worn into worse depressions than expansion joints originally constructed for this purpose. Another argument in favor of transverse joints, and also of longitudinal joints is that, in case it is necessary to excavate into or repair any part of the pavement, a section of 15 feet square or more formed by these joints can be removed without in any way weakening the adjacent pavement, while the breaking out of a section not so divided into blocks is apt to crack and otherwise weaken the concrete beyond the area actually removed. It may also be said that since concrete pavements are seldom laid from one end to the other wthout any intermission they cannot be made entirely monolithic, but there will be a joint between the areas constructed in successive days, which joint it is very difficult, even with the most painstaking precautions, to prevent opening up when temperature contraction takes place.

Attention is called to the special precautions taken in several cities to secure absolute continuity of surface on the two sides of every expansion joint, so that there may be no jar of wheels in passing from one to the other, which jarring is believed to be a very important agent in starting the chipping of the edges of these joints. In one of the pavements described in this issue the edges of the joints are protected with strips of steel angles in order to prevent this rounding off of the angle. On the other hand,

one engineer provides that the edges of all expansion joints be rounded off in construction, the idea apparently being that this much of a rounding would be produced anyhow by wear, and that if rounded off regularly there would be no further destruction to the joint, whereas if chipping be invited by the square joint it would ultimately produce a much wider and deeper depression.

In a few cities the concrete has been covered with a thin bituminous surface composed of some preparation of asphalt, tar or oil, which is applied hot and covered with a thin layer of coarse sand, stone screenings or other gritty surfacing, and one company has made this idea the basis of a special pavement, known as the "Dolarway" pavement, which has already been constructed in several sections of the country.

It would seem that a concrete pavement ought to be laid more cheaply than any other kind of "permanent" pavement, since all other pavements classed under this head rest upon a concrete base, whereas this pavement consists of a base only, with some additional pains taken in preparing the top surface. Another advantage of the concrete pavement is that it may be used temporarily until funds are available for a brick or asphalt pavement, when one of the latter can be laid upon the old concrete pavement as a foundation, and thus the more expensive pavement be provided for in the future without the necessity for destroying or otherwise losing the investment in the pavement at present constructed when the new pavement is laid.

ABRASION TESTS OF BRICK

Relative Losses With Old and New Style Rattlers and With Cubical and Spherical Shot—4,430 Brick Tested —Comparison of Light and Dark Bricks

In studying the matter of abrasion test of paving brick in connection with the preparation of standard specifications for the American Society of Municipal Improvements and the Association for Standardizing Paving Specifications, E. H. Christ, of Grand Rapids, Mich., who was chairman of the committee on brick paving of both those societies, conducted a considerable number of experiments, using both the old style rattler and the new one recommended by the National Paving Brick Manufacturers' Association, using cube shot in the old rattler and both cube and spherical shot in the new rattler. The results of these tests are given herewith to show the difference, as indicated by these tests, between abrasion loss in the new and in the old rattler under apparently similar conditions.

In the first 102 of these tests, samples of brick as nearly the same as possible were placed nine at a time in each of the two rattlers, and 51 of such tests were made in each rattler, but with this difference, that while cube shot were used in the old rattler spherical shot were used in the new. In one pair of tests the old rattler showed a loss .1 per cent. greater than the new rattler, but in every other case the new rattler gave the greater loss, this varying from a maximum of 7.5 per cent. to a minimum of .1 per cent., the average difference being 3.4 per cent. The 51 tests with the old rattler gave an average loss of 14.7 per cent., and the same number of tests with the new rattler gave an average loss of 18.1 per cent. This difference of 3.4 in the percentages of loss really amounted to an increase of about 23 per cent. in the amount of loss due to the use of the new rattler and the spherical shot.

The next 50 tests with each machine were conducted using cube shot in both rattlers, with nine brick in each test. In this case the loss in the new rattler exceeded that in the old in 29 cases, was less than that in the old in 19, and the two were identical in two cases. The average loss in the old rattler was 14.94 per cent., and in the new rattler 15.55 per cent., a difference of .61 per cent, or an actual increase in loss of weight of 4.06 per cent. The maximum difference between the two machines in any one pair of tests was an excess by the new machine of 4.0, and an excess by the old machine of 2.6.

The next ten sets of experiments were made with each set consisting of two tests of nine brick each with cube shot in the old rattler and one test with 15 brick and no shot in the new rattler. This showed about 6 per cent. more loss in the new rattler than in the old in each case except one, where the difference was about 10.5 per cent.

The last 50 sets of tests were made with cubical shot in the old rattler and spherical shot in the new, there being two tests in the old rattler of nine brick each to one in the new rattler with ten brick. These showed a percentage of loss in the old rattler averaging 15.74, and in the new rattler averaging 19.4, a difference between the two of 3.30 per cent. of loss, or a loss in the new rattler 21 per cent. greater than in the old.

The brick used in these tests were 3½ or 3¾ by 8½ or 8¾ by 3¾ or 4. The corners were rounded with radii which in some cases were three-eighths and in other five-sixteenths of an inch.

These figures are given to serve as a guide in specifying loss by the abrasion test when made with the new rattler on brick of this size. The number of kinds of brick tested and the number of tests made are not considered sufficient to cause these figures to be considered as more than tentative, to be used until more exhaustive tests can be made.

Another set of 90 tests was made to endeavor to discover what difference, if any, there is between the abrasion of bricks of different shades. Light, medium and dark bricks were tested, thirty charges of each, each charge consisting of ten bricks, given 1,800 revolutions in one hour. The mean loss of the 300 light bricks was 21.15 per cent.; that of the medium bricks, 20.39 per cent., and that of the dark bricks, 20.59 per cent. This shows a very slight advantage for medium and dark brick, but practically no difference between these two.

WOOD BLOCK PAVING IN AUSTRALIA

In a recent report from a United States consular agent it is stated that the business streets of Wellington are the best in Australia, special reference being made to four miles of wood block constructed eight years ago, which show no signs of wear, "largely attributable to the coating of tar and sand which they receive every year or two." Wood block pavements in that city cost $4.38 per square yard, and macdam costs $1.25. It is claimed that wood block pavements will last under the heaviest traffic for probably twenty years, provided they are occasionally coated with tar and sprinkled with sand. The blocks used were of Jarrah wood, an extremely hard wood, which has been tried in England and in one or two short stretches in this country, but found too slippery for general use. These are laid on 6 inches of concrete, the top of which is floated to a smooth surface. The blocks, which are 5 inches deep, are dipped in hot tar, being placed as close together as possible. Expansion joints of clay 1 inch wide are laid along each curb. The whole surface is coated with boiled tar, well brushed in, and then sprinkled with coarse sand about the size of rice. This tarring and sanding are repeated as found necessary.

In a block pavement which is kept continuously coated with tar and sand the real wearing surface would appear to be this top coat, the blocks serving merely as a cushion course and reinforcement of the foundation, and wood blocks appear to us to be rather expensive cushion material. In figuring the cost of such a pavement, the capitalized cost of applying sand and tar should be added, or the average cost of this per year should be included in the annual cost of maintenance, depreciation, etc.

NEWS OF THE MUNICIPALITIES

Current Subjects of General Interest, Under Consideration by City Councils and Department Heads—Streets, Water Works, Lighting and Sanitary Matters—Fire and Police Items—Government and Finance

ROADS AND PAVEMENTS

Suggest Electric Signs Along Route of Trail

Pueblo, Colo.—Large electric signs at the entrance to each town on the Santa Fe trail bearing the name of the town is one of the suggestions made by the publicity committee of the Arkansas Valley Commercial Association at a joint meeting of the committee held in the Commerce Club rooms. The electric companies of the varios towns will probably be consulted and, if possible, arrangements for the signs will be made. The suggestion was made by the committee without its having investigated the feasibility of such a plan, and so the idea will be investigated in detail before the next meeting. The publicity committee also proposes to have a uniform system of markings on the road. One plan is to have the directions painted on the telephone poles. Another is to have separate signs, either of wood or of metal, and the marks for the road put on them.

Citizens Build New Road

Lawton, Okla.—More than a thousand men, including city and county officials, business and professional men and bankers, took off their coats and built three miles of model road, connecting Fort Sill with Lawton. The county commissioners started the movement and the merchants co-operated by setting aside a day as a holiday, and agreeing to close every business place in the city.

Paving Construction in Rome

Rome, Ga.—If weather conditions change for the better the paving operations in Rome will proceed at a brisk pace and the new work will shortly be started. The wood-block paving on upper Broad street is practically completed. Only a few more days of continuous work remain, until the street will be paved from Sixth avenue to Ross. On the South Side there is more to be done. The new car track will be laid and connected up by the 16th of the month. If there is good weather the paving can be completed within three weeks. The paving of East First and First avenue and a block of Third avenue with wood-block is the next work to be done. Contracts have been signed and bond given by Jamison & Hallowell and the work will begin next week. The Southern Asphalt & Construction Company will commence work on Third avenue and on East Third street about the same time. The first work to be done on these streets will be the laying of concrete curbs and gutters. This will be followed later by the asphalt macadam construction for the street.

Los Angeles May Manufacture Cement for Sale

Los Angeles, Cal.—A proposal to purchase tufa cement from the city may alter the plan of the aqueduct officials to sell the city's cement plant at Monolith. R. R. Sawyer, a contractor, of Whittier, wants to use tufa cement in his work, and has made an offer to the board of public works to purchase seventy-five carloads of that material every year. Tufa has proven to be stronger than Portland cement straight, in mass construction and especially in ditches. It is the material that has been used in constructing the aqueduct and was used by the Romans in constructing the famous aqueducts of olden times. Sawyer wants the board of public works to give him figures on carload lots. The board suggested that he submit his proposal in writing and it would be considered. The city is the only manufacturer of tufa cement known in this country. It owns land along the line of the aqueduct, at Monolith and at Haiwee, where there are large deposits of the tufa rock, which is of volcanic origin. The plant at Monolith probably will be shut down in April because of overproduction. It has been planned to sell the mill at Monolith, and perhaps the one at Haiwee, but if they are to prove a source of income to the city they may be retained.

Will Construct the Storm King Road

Newburgh, N. Y.—The Storm King road between Cornwall Landing and the West Point reservation, the most important and needed link in trunk No. 3, extending alone the west shore of the Hudson from opposite New York city to Newburgh, Kingston and Albany, is to be constructed in the near future, according to an announcement just made. The Storm King Stone Company, whose quarry and rock crushing plant is located on th southerly slope of Storm King on the route of the road, has been an obstacle to carrying out the project. The Palisades Inter-State Park Commission is contemplating the condemnation of the stone concern's property and acquiring the land needed for the right of way.

Colorado State Highway Plans

Denver, Col.—Four thousand miles of State highway, costing nearly two million dollars, have been planned by the State Highway Commission, the construction of which will be commenced this year if court proceedings permit. They form a closely connected system, touching every county in the State. Expenditure of this money upon Colorado's roads during 1912, which would give labor to thousands of men as well as increase travel through the State during the summer, hinges upon the Supreme Court's action upon Highway bill 200, the validity of which has been brought into controversy from the omission in the senate printed journal of the aye and no vote on the final roll call. Approximately $750,000 will flow into permanent road work through the highway commission if this bill is declared valid. Not all of this sum would be available this year. It is conservatively estimated, however, that $550,-000 would be immediately available. Acting upon this advice the highway commission, in outlining the work projected for 1912, apportioned $530,000 among the various counties of the State, reserving $20,000 for the purchase of machinery. San Juan gets $25,000, the largest appropriation, while Pueblo is second with $22,500, and Fremont third with $20,000. Denver county is not provided for. The half million will be more than tripled by funds raised in counties.

Electric Lighting for New York State Roads

Albany, N. Y.—Visions of electrically lighted country highways throughout the State are already plain to Senator Loren H. White, of Schenectady county, who has just succeeded in having passed by the Senate his bill authorizing the State highway department to experiment with ten miles of road to be selected by that department. Should the experiment prove a success Senator White calculates that electric power from the surplus water of the barge canal and other water power owned by the State can be supplied at low cost. "Roughly speaking," said Senator White, "there are 9,000 miles of road in the State, including those improved and to be improved. It is estimated that the concrete poles, heavy insulated wires and lamps all ready to turn on the lights will cost not more than $500 a mile. That would make a total of $4,500,000 for equipment of the 9,000 miles. Only about 4,000 miles are improved, however, and the work would have to be undertaken gradually the same as any other State enterprise, so that it would not require to exceed $2,000,000 for the improved roads we have now. After the first cost the maintenance would be trifling because the road patrolment, now a part of the State highway department, could easily attend to the incandescent lamps, which require attention only twice a year, and the power would be furnished by the State. Senator White says the purpose is to have a 400-candle light every 300 feet and the hoods and shades are to be so fashioned as to throw the light along the highway in each direction and neither upward nor sideways. The State conservation commission is said to be very much in favor of Senator White's plan

City's New Asphalt Plant

Schenectady, N. Y.—Commissioner of Public Works Charles A. Mullen has about completed his plans for the city's new asphalt mixing plant, to be used for repair work on the streets. The commissioner, it is understood, has prepared for publication an article telling just what he intends to have in the shape of a municipal asphalt plant.

Individual Dealings with Contractors Unsuccessful

San Francisco, Cal.—An expose of the methods pursued by street-paving companies and individuals was made at the last meeting of the Richmond Central Improvement Club, when during the progress of a general discussion on the subject it was stated that property holders have been compelled to combine to escape overcharges made by the companies. The club declared itself in favor of recommending to property owners that they combine in every block yet to be paved and curbed and thus secure the benefits from competitive bidding among the street improvement bidders. A statement covering the subject was issued by the club through the president, Daniel V. Drew, as follows: "The subject of street paving was discussed at some length and the methods of the contractors in wringing enormous profits from the people were exposed. The contractors circulate contracts calling for a rate of 26 cents per square foot for paving, $1.35 per foot for curbing, and from $1.10 to $1.50 per front foot for crossings, then induce some property owner in a block to sign the contract by giving him a separate contract for as low as 14 cents per square foot for paving and $1 for curbing and 70 cents per front foot for crossings. After securing a few signatures in this way the project is fairly launched and it is easy to secure the signatures of the remainder of the property owners necessary to secure a permit from the board of works to pave the block. The people in one block at least in this district have had the good sense to combine and make the contractors bid against each other, with the result that the lowest bid secured, which is a uniform price to all property owners, was 18 cents per square foot for paving, $1.15 per foot for curbing and 80 cents per front foot for crossings. This means a saving of over $50 for every 25-foot frontage. When the people awake to the fact that by treating individually with contractors they are systematically plucked, they may see the wisdom of uniting and making the contractors bid against each other." Active members of the club expressed themselves as annoyed at the delay and indifference of the fire commission in regard to providing fire protection for Richmond district.

Old Belgian Blocks Cause of Untidy Streets

Birmingham, Ala.—Commissioner James Weatherly is heartily in favor of replacing the Belgian blocks in the business sections of the city, provided the majority of the adjoining property holders are willing. He stated recently that he was satisfied the block pavement was unsightly and insanitary, and that it should be replaced with either brick, bitulithic or asphalt pavement. Mr. Weatherly said: "I would like to see every foot of Belgian block pavement torn up and replaced by any of the smooth pavements. The difficulty to keep the pavement clean is one of its principal objections. That the city is doing its best to keep the streets clean is evidenced by those streets that are paved with brick, bitulithic or asphalt. I think any fair-minded person will concede that these streets are kept clean. One of the difficulties to contend with on Twentieth street and First avenue below Twentieth street, where the Belgian block has been subjected to possibly the heaviest traffic in the city, is the fact that it is the lowest part of the city and the constant rains keep the wornout places muddy. This, of course, is a good argument for its removal." Judge Lane also favors the removal of the Belgian blocks, provided the adjacent property holders are willing. He expressed some doubt as to forcing the payment in the event of the property holders not being in favor of the change. He said, however, he would be pleased to see the Belgian block replaced by a more desirable material, but the city was not in a position financially to undertake the proposition. He suggested that the property holders were the ones to see in the matter, and said, with a smile, "It is easy to talk improvements when some other fellow foots the bill."

Has Plan to Cheapen Paving

Eugene, Ore.—C. P. Barnard, of Roseburg, who owns considerable property in Eugene, was in the city last week and has been working up a sentiment in favor of organizing a paving district covering about all the city which it is thought will be paved in the next two years. The purpose is to agree upon a uniform pavement which will be adopted as to width of street, curbing, etc., and ask for competitive bids on the entire district as a whole instead of letting it out in contracts of a few blocks at a time. He says at least 20 per cent. of the cost of paving can be saved in this way, as many large companies will be drawn into the competition and the price will be materially reduced. The city could employ some competent man to supervise the work and see that the contract is specifically lived up to as to material used and workmanship done.

Land Owners Petition for 40-Foot Paved Road

Noblesville, Ind.—The first official step to establish a boulevard between this city and Indianapolis has been taken when a petition of 176 land owners was filed with the commissioners in this city asking that the road be opened and improved with macadam. While the final specifications were left for the civil engineer to work out, it is understood that the boulevard will be one of the finest highways in the State for automobiles. The hills will be cut down, the curves taken out, the width will be at least forty feet and the surface so hard and smooth as to have the durability of a paved street. The contemplated improvement is largely the result of the agitation to have a road extending out of the city. It is the purpose of those behind the improvement to have it completed the coming summer.

Recommend New Bridge Site North of Protectory

Newark, N. J.—The West Hudson members of the Hudson County freeholders' bridge committee have recommended that the Arlington terminus of the proposed new bridge across the Passaic be north of the Catholic Protectory, which was one of the sites viewed by a number of Kearny citizens. The span, if this site is selected, would be 147 feet high at Passaic avenue. The cost of the structure, it is said, will approximate $1,500,000. At the next meeting of the freeholders it is expected the county engineer will be authorized to make plans in conjunction with the county engineer of Essex County.

Memorial Highway and Arch for Thomas Jefferson

Washington, D. C.—Representative Flood, of Virginia, has introduced a bill to erect a Thomas Jefferson memorial highway from Charlottesville, Va., to the Jefferson home at Monticello, Va. He asks $100,000 for the highway and a memorial arch at Monticello.

County Good Roads Convention Meets in Waterloo

Waterloo, Ia.—The recent county good roads convention, which was presided over by C. A. Rownd, a member of the board of supervisors, was largely attended. N. B. Barber, civil engineer and county surveyor, was the first speaker. He divided road improvement into three parts—alignment, drainage and surfacing. The improvement of the highways is a real need and each county must look after its own work. Mr. Barber said there was no good reason why this county should not have the very best of good roads, because there is an abundance of clay, gravel and stone for surfacing. The southeast part of the county is least accessible to surfacing material, but he thought that even there the requisite supplies could be found near at hand. He advocated the idea of a methodical investigation for materials with which to improve the roads and to mark their location on a map which should be kept at the court house. While it is impossible to improve all the roads in a single season, the speaker urged the necessity of making a start and to build and finish a certain amount of highway each year. Much interest was manifested in the presence of B. Stanton, a road supervisor from Poweshiek county, who gave an address on "Road Building Under the County System." Mr. Stanton has achieved the distinction of being one of the most skilled road makers in the State, and has been able to accomplish surprising results in his county. Mr. MacDonald, president of the Iowa Good Roads Association, was also present.

SEWERAGE AND SANITATION

Work Started on $60,000 Sewer

Akron, O.—Work has started on the extension of the main trunk sewer one mile further north in the Cuyahoga valley to comply with orders from the State Health Board. Hunt & Son are building the sewer which is to cost $60,000. The extension will reach the point where the sewage disposal plant is to be built.

Big Sewer Nearly Completed

Dallas, Tex.—The work on the big storm sewer in South Dallas, running on Pennsylvania avenue from Atlanta to Whittaker and Lenway, has been practically completed on the west end up to the Houston and Texas Central Railroad. This sewer will, when completed, drain a large area south of Forest avenue and be one of the largest constructed in Dallas for some time. It is eighty-eight inches in diameter at the opening at Lenway and Whittaker and has laterals extending up the cross streets, crossing Pennsylvania. The sewer is of concrete and will, when completed, cost about $38,000.

Gas in New Sewer Mains

Keyport, N. J.—An inspection of the new sewer system in Keyport has developed the fact that illuminating gas has filled the mains, and that unless due caution is maintained frequent explosions are liable to occur. In making an inspection, Mayor W. E. Warn, Superintendent of Public Works Bedle and Engineer C. E. Rever came near raising all the manhole coverings in the Borough. They were on a tour of final inspection, and had commenced their labors in the western part of the town. They found the sewer filled with illuminating gas and after inserting a lighted newspaper caused three distinct explosions. The test made included the passing of an eight-inch wooden ball from one manhole to the other, to show that no obstruction existed. The lighted paper was inserted in a manhole near the Catholic Church property. Three manhole coverings were lifted clear. The inspection was discontinued and all the manhole coverings have been taken off and red warning flags inserted to protect the public. This is done with a view of letting the accumulated gas escape.

Lynn Sewer Service Is Inadequate

Lynn, Mass.—City Engineer George I. Leland favors an immediate investigation along scientific lines into the sewerage system of Lynn, whch he frankly declares to be inadequate in many respects. At least $1,000,000 would be needed to make the improvements that Mr. Leland has in mind, but he asserts that after the work is completed the city would have its money's worth. By a thorough overhauling of the present system, it is pointed out by Mr. Leland, the drainage division of the street department would be relieved from heavy financial burdens which annually handicap the efficiency of the service. By some experts an estimate of $5,000,000 has been placed upon the probable cost of the proper development of the Lynn sewers, but Mr. Leland says he is sure that this figure is excessive. The primary reason for the unsatisfactory condition of the sewers in many different spots, Mr. Leland says, is that the two big main arteries, the eastern intercepting and the western outfall sewers, are not large enough to take care of the entire volume of flowage.

Claim Sewage Will Kill All Fish in River

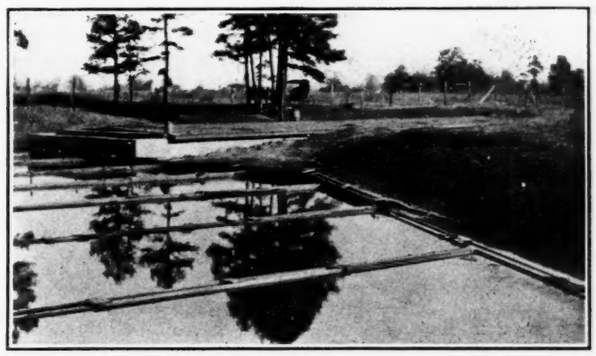
Chicago, Ill.—To the city of Chicago, the most important feature of the visit of Secretary of War Stimson was his inspection of the drainage canal. The trip was planned because of the request of the city and sanitary district to take 10,000 cubic feet of water a second from Lake Michigan. It is claimed this much is necessary to properly dilute the sewage of the municipality. The district now has the right to take 4,167 feet a second. Unless the request is granted it is claimed all the fish in the Illinois river will be killed. Approximately 46,000,000 pounds of fish annually are sold from the stream. It is maintained by Chief Engineer George M. Wisner, of the sanitary district, that Chicago will be compelled to expend between $40,000,000 and $60,000,000 for adequate facilities to dispose of sewage, unless the request is granted. City, county and federal officials accompanied the secretary on the trip.

New Housing Ordinance Desired

Indianapolis, Ind.—Dr. C. S. Woods, city sanitarian, has asked the city legal department to prepare an ordinance giving the city board of health the right to prevent the occupation of any dwelling or tenement house that is unfit for human habitation. The ordinance will give the health board the right to prevent the occupation or to require the vacation of any place that is deemed unsanitary until the place has been repaired or improved, according to the recommendations of the health board and the city building code. The state tenement house law gives the health board unlimited powers in this respect, but the law contains no penalty clause, which prevents its proper enforcement.

Disposal Plant Does Not Dispose

Hope, Ark.—The city of Hope has been forced to take some active steps toward remodeling their treating plant, which consists of a septic tank and a slow sand filter bed. As the plant is between a public wagon road and the city



NEW CENTRAL FIRE STATION AT WATERVILLE, ME.

park, less than one-fourth mile from town, any odor is very objectionable. The septic tank never has been satisfactory and the filter bed is constantly under water, having become sealed. The tank will have a concrete roof put on in place of the present wooden one and the filter bed will probably be moved a mile or more further from town.

Claim Drinking Water Has Bad Taste

Racine, Wis.—Complaint to the effect that there is something wrong with the public supply is becoming quite general, although Manager F. M. McElroy, of the water company, claims that no objecting reports have reached him. Chief of Police Henry C. Baker, who is the health officer of the city, has had no complaints either, but the fact remains that many are noticing a peculiar taste which they fear may indicate a condition injurious to health. Mr. McElroy says that the regular chemical, bacteriological and microscopical tests of the water warrant the statement that it is wholesome for domestic use. He admits that he is treating the general supply with six pounds of hypochlorite of lime to each 1,000,000 gallons of water, but he says with the present consumption of water amounting to 27,000,000 gallons per week, he does not think even a chemist could get a trace of the disinfectant as far away from the pumping station as the Hotel Racine. Mr. Elroy says there may be something to the suggestion that the ice flows crushing about on the bottom of the lake may have dislodged foreign matter that is reaching the intake and that it may have something to do with the taste of the water at times. So far as is known no cases of illness have been traced with any degree of certainty to the water. The health department has not officially critized the water supply.

Seattle Health Department Studies Rat Migration

Seattle, Wash.—Health department officials have released 25 dyed rodents for purposes of identification. Each rat has a price of $2 on its head, whether dead or alive. The purpose is to trace the drift of the rodent population as it drifts from one section of the city to another. "At this time of the year rats leave the water front, where they stay during the winter months, and make their way to hill and residence portions of the city," said Health Commissioner Crichton. This is one of the precautionary measures taken in connection with plague prevention work carried on by the different cities on the Pacific Coast.

WATER SUPPLY

New 30-Inch Water Main Nearly Ready

Jersey City, N. J.—The final connections of the new 30-inch water main providing Bayonne with additional water supply facilities were completed on this side of Newark Bay last week, when the pipes were joined up at the Morris Canal bridge at the Boulevard. The work on the Arlington end of the undertaking was commenced by a large force of workmen employed by the Hudson County Water Company, under the direction of Superintendent Charles F. Kavanagh, and it is expected that the entire pipe line from Little Falls, Passaic county, to Bayonne will be completed in about three weeks. For years past Bayonne has been more or less handicapped in the matter of its water supply, as only one 30-inch main was available. Within the past two or three months there have been times when something very much akin to water famine conditions prevailed for days at a time. The City Council finally adopted a mandatory resolution calling upon the water company to supplement its contract by installing an additional main, and the present satisfactory condition is the result.

Will Rehabilitate McKeesport's Water System

McKeesport, Pa.—After several months of study and work on the part of Engineer Hudson, the board of water and lighting commissioners, after an analysis of the report of the engineer, have estimated that it will cost the city close on to $500,000 to rehabilitate the city's water system, install new machinery, new mains, an intake into the Monongahela river and to make other changes that will be of vast benefit, one of which will be to provide better fire protection in the outlying wards by reason of better water pressure. The report of the commissioners contains the recommendations that the board believes will solve the problem which has confronted it for the past several years—to obtain a better water supply and to supply it at less cost than at present. The commissioners not only estimate that this can be done, if the changes, as recommended, are made, but that a saving in cost of operation, including the purchasing of chemicals and fuel, will be sufficient to pay off the principal and the interest on the bonds, so that there will be no reason for a tax levy increase.

Unusual Conditions Overtax Filtration Plant

Philadelphia, Pa.—Conditions of the water supply continue such that Director Neff persists in his warning that householders should continue to boil water for at least two weeks. This applies particularly to West Philadelphia, where the raw supply from the Schuylkill river went to the Belmont filter beds in such condition that the filters were incapable of extracting the bacteria as completely as would be possible under conditions that are normal. The recent heavy rains which scoured the hills and streams of the accumulation of all substances during the winter and sent it down the Schuylkill, produced such a condition as the city has not had to contend with since scientific treatment of the water supply was undertaken. While the water is clearing the danger will not have entirely passed for two weeks. The question of the use of chemicals in the West Philadalphia supply has been taken up. For two years chloride of lime has been utilized in the treatment of the supply filtered by the Torresdale plant, as a safeguard in destroying the bacteria. The advisability of providing some additional safeguard under such unusual emergencies as the present, when the water supplies of many cities are in practically the same condition as that of this city, is now engaging the attention of Directors Neff, of Health and Charities, and Cooke, of Public Works, and Chief Dunlap, of the Water Bureau.

Expert advice has been asked upon the further protection of the water supply, and a committee is now preparing a report on the conditions observed during the severe test to which the filtration system has been subjected.

This committee consists of Dr. A. C. Abbott, former chief of the Bureau of Health, who was named by the University of Pennsylvania; Dr. Clement B. Penrose, chosen by the College of Physicians, and James Mapes Dodge, vice-presi- named by the society.

Undiscovered Leak Causes Water Shortage

Sebastopol, Pa.—For the past few days residents of the central section of the town have been handicapped by a shortage of water service. There has been a break in the water main which passes through the town and it has not yet been located. In the meantime the residents are put to much inconvenience, and through underground crevices the water has flowed into a number of cellars.

Work on Filtration Plant Delayed

Fargo, N. D.—As soon as the connections are made between the smoke flue and boilers there is nothing to prevent the big boilers at the filtration plant from being fired. There has been considerable delay during the winter months in the filtration plant and there doesn't seem much probability of the plant being ready to pump pure water into the mains of the city much before the first of July. The suction line is delaying matters at the present time and when this and the connection with the big stack are made then the fires can be lighted under the boilers. The Allis-Chalmers engine will be tuned up and placed in first-class shape as soon as posible and one of the company's experts, Mr. Sturgeon, of Milwaukee, is doing the work. City Engineer Anders says that the plant is in first-class condition, but the work is not nearly so far advanced as he would like to see it, and that it will be well along in the summer before the water will be pumped in the mains and be ready for domestic use. He says that the experts who have been in Fargo several times since the plant was commenced claim it is the most complete and up-to-date that has been put up in the country.

Manufacturers Saved Money by Wasting Water

Harrisburg, Pa.—On recommendation of the water commissioners Councils last week approved the changing of several of the water rates so that manufacturing concerns using a small amount of water will not be able to cut down their expenses by letting the water run and get within range of a cheaper rate. It was learned by the water commissioners that at some industries the men watch the meter near the end of the month and by letting the water run have been able to get it at a cheaper rate. The more water used by any concern the cheaper it becomes, according to all the rates. By the former rates, 10 cents was charged for less than 5,000 gallons, and for any amount used between 5,000 and 10,000 gallons. If the meter registered more than 10,000 and up to 15,000 gallons, the consumer was charged only 7½ cents on each thousand gallons used. In an incident of this sort any concern seeing that its water meter was registering within a few hundred gallons of 10,000, would promptly find use for more, and would run the water until a few gallons more than 10,000 had been registered, and thus get water at a cheaper rate. The new rates requested by the water commissioners place 5,000 gallons as the 10-cent limit, just cutting the former amount in half. From 5,000 to 10,000 gallons the new rate is 8½ cents; 10,000 to 15,000, 7 cents; 15,000 to 30,000, 6 cents, and so on down the list to a million gallons and over.

Pipe Line System Ready

Baltimore, Md.—Baltimore's high pressure fire pipe line will be opened on March 20. It was stated that the flooring work and the painting being done at the South street pumping station, from where the pipe line will be operated, will not be finished until that time. The three pumps, are however, all connected and ready for operation. One of the pumps was worked for several days last week and introduced a pressure of 150 pounds in the pipe line. The test showed that the system is flawless, a slight accident at Fayette and Holliday streets having been through no fault of the system, but of an employe who had neglected to insert a hydrant cap. The quarters for the firemen who will have charge of the pumping station are now ready for occupancy, and this crew is ready for duty upon the completion of the tiling and painting. The superintendent of the high pressure system of the Borough of Manhattan, New York, has visited the city for the purpose of inspecting the new high pressure system. He was taken through the South street pumping station by Daniel B. Banks, chief engineer of the system. He was loud in his praise of Baltimore's new fire fighting apparatus, acclaiming it the finest in the world.

STREET LIGHTING AND POWER

Will Lower Lighting Rates

Lynn, Mass.—The electric light rates are to be reduced by the municipal light commission from the present price, 15 cents a kilowatt, with a reduction of three cents, to 12 cents a kilowatt, with a reduction of two cents. The new rate will bring the net price to 10 cents per kilowatt, providing the monthly bill is paid on or before the 15th of the month. The new price will be the lowest which has ever been submitted to the people of Marblehead and speaks well for municipal ownership and the management of the plant. The new rate will go into effect on April 1, according to a statement made by Commissioner Raymond O. Brackett.

Agitation for Municipal Light Plant

Winooski, Vt.—A petition is being circulated among the voters to have an article inserted in the warning for the annual village meeting in regard to a muncipal light plant. The success of the village water department is given as a reason why the village should own its lights. There seems to be a strong sentiment in favor of the project.

Propose City Establish Municipal Lighting Plant

Orange, N. J.—Municipal street lighting in Orange having proved satisfactory, after a year's service, a movement was started at a meeting of the water and street committee of the Common Council looking to the installation of commercial lighting service. Alderman Smith, chairman of the committee, who brought up the matter, announced that a number of people had suggested that the city go into the commercial lighting business. Authority for providing such service is granted, it was stated, in the law under which the municipal street lighting system is being operated. Chief Engineer Henry M. Berg, of the municipal power plant, was asked if it would be practical for the city to furnish commercial lighting. He replied that such service could be given at a comparatively low cost. Some new machinery would be required, and one extra man would have to be employed at the power plant, he said. The engineer admitted, however, that a separate system of wiring would have to be provided, as the present lines must be used exclusively for street lighting purposes. Tables are being prepared by Mr. Berg showing the actual cost of municipal street lighting during the first year that the plant was operated. It is understood that his figures will show that it cost the city $50 to maintain each arc lamp. To this amount must be added about $10 for the fund to be created to provide for depreciation.

Commissioners Visit Nisqually Power Plant

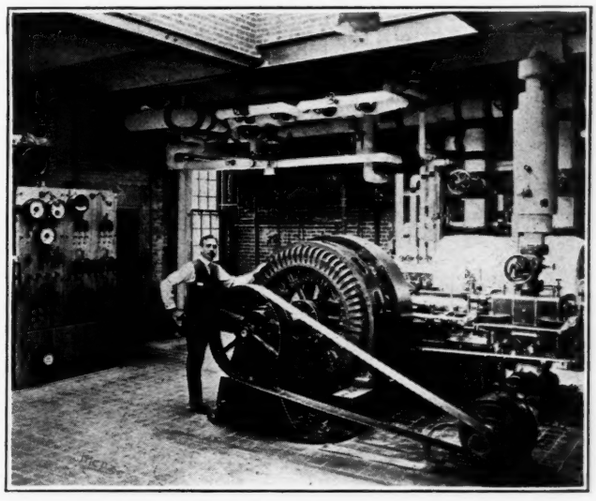
Tacoma, Wash.—Work has progressed so far on the Nisqually municipal power plant project that the power house at La Grande is ready to receive the machinery and equipment to be shipped from Milwaukee, according to Mayor W. W. Seymour. Commissioner H. F. Gronen, who is also chief engineer of the project, told the municipal commission that the machinery could be shipped from Milwaukee now and be installed immediately upon its arrival. The machinery which is ready consists of only the first two 8,000 horsepower units, however. The municipal commission spent a day at the plant recently. Both reservoir and power house were inspected, as well as the work in the tunnel and the completed work at the head-works of the project. Members of the commission were more than satisfied with the progress made. "It certainly is a plant to be proud of," said Mayor Seymour. "The concrete work at the headworks, of course, is something that I have always admired and will continue to admire. It is simply great. The tunnel is being made ready for lining with concrete, the forms being put in place now. The reservoir is almost finished and looks well." The commissioners were pleased with the concrete work being done by Contractor Hans Pederson. Instead of gravel he is now mixing with the sand rock that has been taken from the long tunnel and crushing it at a plant established where the rock was dumped. The quality of the concrete work is improved very much by the crushed rock mixture, said the commissioners.

Plan to Install Niles New Lights

Niles, O.—The materials for the new street lighting system are all on hand and just as soon as the ground thaws the work of installing the system can be finished. It will require only a few weeks of steady labor to put it in, ready for use, on all the business streets.

City Has Its First Municipal Electric Light Plant

Yonkers, N. Y.—What may be the nucleus of a plant for the furnishing of light and power for the group of buildings in and surrounding City Hall Park, is shown in this picture. This engine, of one hundred horse power,



Courtesy Yonkers *Herald*.

LIGHTING PLANT AT TRADE SCHOOL.

operated at 60 per cent of its full capacity, now furnishes all the light and power required in the Trades School, and Principal Joseph Eaton, of the school, is of the opinion that by adding another unit engine the High School, Public Library and City Hall could easily be supplied. The generator is technically known as a "Seventy-five K. V. A," of the Westinghouse make and the engine is a Fitchburg high speed engine.

FIRE AND POLICE

Hose Wagons to Precede Steamers

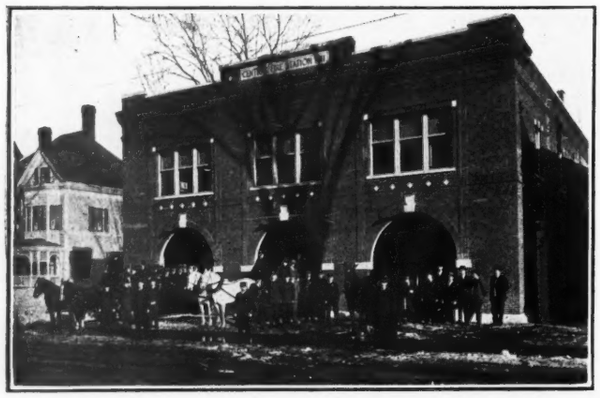
Bridgeport, Conn.—At a special meeting of the fire commissioners it was voted to put into effect a new order to the effect that in the future in answering alarms the hose wagons should precede the steamers out of the houses and should reach the fire first, lay their hose by the time the steamers reached the scene, which lessened the amount of smoke which the fire horses were obliged to stand.

Small Fire Loss for Year

Dallas, Tex.—As Fire and Police Commissioner Fred W. Bartlett figures it from the annual report of the Fire Chief for the fiscal year ending May 1, 1911, each fire alarm cost the city of Dallas about $215.70. This is based upon the report's showing that there were 768 alarms and a cost for the department of $165,644.92. In this cost are the salaries of 128 employes, making $110,469.95, and practically $10,000 worth of new apparatus bought in the year. The fires in which the apparatus was used in extinguishing the flames were 365, or exactly one each day of the year, on the average. The commissioner, figuring from the report, shows that the property involved in the fires had value of $5,838,175, counting only the buildings in which the fire hazard actually existed, not those near at hand or the others into which the fire might easily nave spread, but for the work of the men commanded by Fire Chief H. Frank Magee. The actual property loss was $818,163, or less than one-seventh of the values. The insurance loss on these properties was $576,653, or less than one-tenth the actual value. As the insurance placed in the city is said to be $100,000,000, it is estimated that the insurance loss of $576,553 was but little better than one-half of 1 per cent. on city business for the insurance concerns.

Steam Carries Current from Wire to Engine

Jersey City, N. J.—A Jersey City fire engine became charged with electricity a few days ago while playing on a blazing freight car in the Erie yards. Four firemen after receiving shocks suspended work and informed the engineer. He investigated and found the engine was under overhead trolley wires, and each time the steam was released from the exhaust and came in contact with the wires, it acted as a conductor and carried the electric current to the engine.



Courtesy of Kennebec *Journal.*

NEW CENTRAL FIRE STATION AT WATERVILLE, ME.

City Electrician Devises New Telephone System

Pensacola, Fla.—Satisfactory in every respect is the new telephone system now in operation at the police station, and which was perfected by Len LeBaron, city electrician. Not only does it work satisfactorily but it saved the city an expenditure of at least $6,000. The system is used on the private telephone system over which the policemen on the beats make their reports to the station, the result accomplished by the new attachment being that an officer (provided he should be so disposed) cannot now report from one box and say that he is at another. The device is so arranged that when the officer calls the station the bell on the 'phone in the station designates by taps the number of the box calling. Besides the indication of the bell, there is a tape attached to a machine, on which the number registers simultaneously with the tapping of the bell, thus giving a double check system, so that if through any error, or in case the attention of the desk sergeant is attracted so that he does not properly count the taps of the bell, the number is registered anyway. Another advantage of the new system is that it precludes any possibility of a misunderstanding in case of a call for the patrol wagon. Under the old system it was not an uncommon occurrence for the desk sergeant to fail to understand distinctly the number of the box to which a patrolman ordered a wagon. Of course, with the new attachment this will not happen, as the number will be registered, just as when the officer uses the telephone to report. The working of the system is as simple as anything of the kind could be made, all that it is necessary for the officer using the station 'phone, or patrol box to do being to pull a lever down and turn it loose. When the lever goes back into place it registers the number of the box as described. The perfection of this arrangement is the result of weeks of study and work on the part of Mr. LeBaron, who set to work to supply the need of the city with no pattern or plan to copy after, and he has succeeded in working out a system which thoroughly answers the purposes and is believed to compare favorably with any system used by any of the large cities in the country. Prices were obtained from the leading manufacturing companies all over the United States and it was found that it would be impossible to install such a system for less than $7,000. It was then that Mr. LeBaron determined to work out a scheme to serve the needs of the city and at the same time save money. The result was that the system which he has completed and which is now in use was perfected for about $800.

Comfort of Indianapolis Policemen Considered

Indianapolis, Ind.—A fight of several months by Councilman Charles F. Copeland to obtain a steam heated contrivance for corner policemen to stand on, came to an end when Mayor Shank signed an ordinance appropriating $800 for the placing of such devices. The signing of the ordinance was made an impressive occasion. At Copeland's request, the mayor used Copeland's pen, containing purple ink, in signing the ordinance. Copeland intimated he would treasure the pen as long as he lived.

Move Into New Fire Engine House

Racine, Wis.—The members of Company No. 2 of the Fire Department have moved into their new quarters. The new fire station is one of the handsomest and most conveniently arranged buildings in the city. The wainscoting along the walls on the first floor extends up four feet or more, while the walls are covered with especially hardened plaster. The wash room in the rear has walls of especially hardened plaster, which has been enameled, giving the impression that it is marble. There are a large number of lockers along the side of the wall on the first floor. On the second floor is the large and dry sleeping room for the crew, and a special bedroom and office for the captain. The bath room, with both a shower and a bath tub, is also on the second floor. There are also a number of other lockers on this floor. The building is equipped with electric light; there is both hot and cold water, and the floors are of hard wood. It was constructed at a cost of about $7,000.

Will Install Safety Fire Alarms

Scranton, Pa.—Superintendent W. J. Neave, of the division of fire and police alarms, will install a small bell system to give the warning of fire in the office of Superintendent H. F. Ferber, of the bureau of fire. The present system gives the alarm from the box in the alarm headquarters only, and the alarm is sent out by the operator in that department. Heretofore the city has been running more or less of a risk during the late hours of the night and early hours of the morning, as the operator works alone, and in case of illness or death occurring with the operator as a victim while he is on duty, there would have been no check, no means of knowing whether or not a fire alarm had been sent in to headquarters. The small bell in the office of the bureau superintendent will receive the box of the alarm as soon as the operator, according to the arrangement now being put into effect, and in the event of some unforeseen accident occurring in the operator's room, the superintendent on duty would at once investigate. Another good reason for the additional alarm is that it gives the superintendent a few minutes' start. The job of operator in city hall is not the most attractive position in the world. There are three shifts, of eight hours each, and the men work for the most part alone, the exception being when Superintendent Neave is busy in the office during the day. If the operator were taken suddenly ill, for example, in the night, it might be an hour before anyone would find out about it, and it might be two hours. After the bell system is installed in the office of Superintendent Ferber, small bells will be placed in each of the three daily newspaper offices of the city, to give the newspapers first information on the fire alarm calls sent out by the operator.

City Purchases Auto for Police Department

Indianapolis, Ind.—The services of high class touring cars have come to be recognized as indispensable in metropolitan police departments. Indianapolis, which is rapidly installing motor cars in all departments where the horse can be displaced to advantage, has just purchased another Premier car of the six-cylinder, seven-passenger model, for use in police work. This is the second Premier car in the police department. Chief of Police Hyland has come to the conclusion that a dependable motor car is one of the most important factors in successful police work. The car should be of the regulation touring type, so that its identity can not be detected by malefactors, and it should possess strength and endurance, as frequently it will be called on to carry as many big police officers as can be loaded into it. Loaded with seven big policemen, the new Premier car in the Indianapolis police department received a thorough tryout and was pronounced satisfactory in every respect.

AUTO APPARATUS NOTES

Chicago Receives First Wholly New Auto Steamer—Chief Quigley Says Complete Auto Equipment Would Double Efficiency—Schenectady Interested in Tractors—Newark Builds Double House for Autos.

Lynn, Mass.—A demonstration of a Webb auto pumping engine was made at Lynn last week in the presence of members of the Municipal Council and about 200 citizens. At the conclusion of the demonstration, Mayor Connery, Commissioner of Finance Frank A. Turnbull and Chief Thomas A. Harris expressed themselves as being very favorably impressed with it, both as a useful piece of kit at a fire, and in speed in reaching the scene. Chief Harris stated that it was the best piece of kit of its kind that he had ever seen, but suggested several improvements that might be made as to accommodating men. It is just the kind of an outfit needed in a section like Glenmere, Lakeside and Wyoma, for it could certainly get on the job quickly, said Chief Harris. This machine was the middle size made by the company, the larger one being of 800 gallons capacity, while a smaller size, just sold to the town of Wakefield, is of 450 gallons capacity. The machine shown is of the size most desired by small cities. The company is said to have a record of 27 hours continuous service with one of the same type, and of the 110 machines now in use, not one has ever balked at a fire, or refused to respond to all the work given it to do. The test given was not an official one, and in the event of the council and department looking on the question of purchase in view, an official test will be given. What was shown was more than satisfactory to those who witnessed the work, and even the high power was at no time used. More auto apparatus for Lynn seems certain, and one of these machines for the outlying districts is probable.

New Castle, Ohio.—Purchase of four new auto trucks, one for the Eastside, one for the Westside, one for the North Hill, and one for the Mahoningtown department, and the purchase of an auto for Fire Chief Frank Connery, has been recommended by the members of the Fire Committee of Councils, and an appropriation of $19,500 has been placed in the budget of appropriations for the year for the purpose of purchasing them. The recommendations will be up to the Councils and the Finance Committee for approval. New Castle already has an auto fire engine in the central department, and if the four additional trucks are secured they will be placed in all of the hill districts. The new machines will be placed in the buildings which are now used, replacing the horse-drawn apparatus.

Morristown, N. J.—The old horse-drawn truck of the Resolute Hook and Ladder Company responded to its last alarm March 5 and marked the end of the horse regime and coming in of the automobile age in the local truck house. The new truck shown in the illustration was purchased from the Mack Bros. Motor Car Co., Allentown, Pa. It is a very substantial truck. The wheel base is 216 inches, front wheels 36 inches in diameter, rear 42. Speed 30 miles per hour. The frame is of channel steel and the tires are solid rubber. Altogether 278 feet of ladders are carried, in detail as follows: One 50-foot extension, one 35-foot extension, three 25-foot wall, three 20-foot wall, one 16-foot inside extension, one 16-foot roof, one 16-foot wall, one 10-foot wall. For warning signals the truck is equipped with a siren, locomotive bell and Jericho horn. A complete line of minor equipment is carried, as follows: Four ladder poles, 6 pickaxes, 2 flathead axes, 20 pull-down hooks, 2 wall picks, 2 crowbars, 1 shovel, 1 scoop, 1 tin roof cutter, 4 pitchforks, 1 plaster hook, 6 lanterns, four 3-gallon Babcock extinguishers, two 6-gallon Babcock extinguishers, 1 pull-down hook and chain, 2 carbide cellar lights, 6 ball hooks, 4 collapsible rubber baskets, 1 swivel searchlight.

Syracuse, N. Y.—Unless Syracuse soon begins the gradual adoption of motor-driven apparatus its fire department will be completely outclassed by all large cities and many considerably smaller than Syracuse. This is the opinion of Chief John P. Quigley. "Motor apparatus would not decrease the department either in number of men or equipment, but it would more than double its efficiency, and I feel certain it would greatly reduce fire loss," said the chief. "Syracuse has a large area to be covered, which means long and hard runs, especially in the winter time. Give this city one combination hose and chemical wagon with a short ladder equipment, capable of a speed of forty to fifty miles an hour, and the saving in property the first year would more than pay for it. Fires can never be wholly prevented, but the secret of saving property is the rapidity with which apparatus can respond to an alarm, no matter where the fire may be. The combination hose wagons and chemical engine, a tractor for fire engines and ladder trucks, I think, the most important needed pieces of motor-driven apparatus in this city at present. Flying squadrons are useful where men are needed more than heavy apparatus, and the plain automobile chemical engine is useful, but the tractor and the combination wagon would be the most valuable of all. One man could drive and also operate a gasoline-propelled steam fire engine, because there would be no horses to watch, so that the two extra men could be made active fighters. One man would be all the crew necessary for the combination wagon, and he could leave his wagon and aid in the fighting.

Anderson, S. C.—The large automobile fire truck, which was purchased by the city council, has arrived, and has been put into service. It will respond to the next fire alarm with the three-horse trucks. The auto cost $5,500 and is capable of developing 72 horse-power. It carries 1,400 feet of hose, a chemical tank of 40 gallons, ladders, axes, picks, crowbars, and in fact everything that goes to make up a modern fire-fighting outfit. The machine was purchsed with the proceeds received from the one per cent. tax on the fire insurance companies doing business within the city limits. Last year this city received about $500 from this source. That amount represented a little more than six months, the act having been effective only during that length of time. The city expects about $1,000 for the year 1911, which is due now. These two sums supplemented with proceeds from the sale of some of the horses displaced by the automobile, will be sufficient to make the first payment of $2,500. The remaining $3,000 is to be paid in three annual installments, of $1,000 each, as the city receives its share of the revenue from the insurance fund.

Courtesy Morristown *Record*,

MORRISTOWN'S NEW AUTO FIRE TRUCK.

Chicago, Ill.—With the delivery of its first automobile engine Chicago has leaped to the forefront of cities seeking the most modern fire-fighting apparatus. The appearance of the first of three of these engines provided for in the annual budget created a sensation in the streets. The roaring attracted a crowd to the north end of the City Hall. The management of Powers' Theater were alarmed. Fear was expressed that the audience might believe the house on fire. E. A. Wilkinson, representative of the Nott Fire Engine Company, had charge of the machine and will superintend the official test. The engine weighs nine tons. The rear wheels are 5 feet high. The wheel spokes are 3 inches thick and the crank shaft weighs 185 pounds. It has a speed of 35 miles an hour. It is the first gasoline-propelled steam fire engine built entirely new in the United States, and on this point Chicago claims the lead, although there are six other rebuilt engines in service of same type.

Norwich, N. Y.—Fire Chief C. H. Latham has just been having an automobile equipped in Utica to serve as a piece of fire fighting apparatus. Mr. Latham is a business man in Norwich, operating a hardware and plumbing establishment and a garage and machine shop. He is also at the head of the volunteer fire department and it was his connection with this that brought him to Utica recently, on an errand of importance to his home town. Some time ago Chief Latham conceived the idea of having an ordinary touring car converted into a combination engine for fighting fires, and, having become possessed of a second hand 50-horse-power Thomas car, he proceeded to interview the O. J. Childs Company, of Utica, with regard to having it fitted up with the necessary equipment. The work was undertaken and the apparatus is now completed. The entire cost of the new combination chemical hose and ladder piece will, it is now understood, reach only $1,500 or $1,800, whereas a regulation motor truck and chemical, if purchased from a concern engaged in the manufacture of such vehicles would, it is said, run from $7,000 to $10,000. The new automobile to be used in Norwich is equipped with two 40-gallon copper tanks, built especially by the Childs Company, to fit up the machine; a reel, manufactured by the same concern, capable of carrying 250 feet of chemical hose, fitted with a shut off nozzle; a box for rubber coats, hats, etc., of the men, and several scaling ladders.

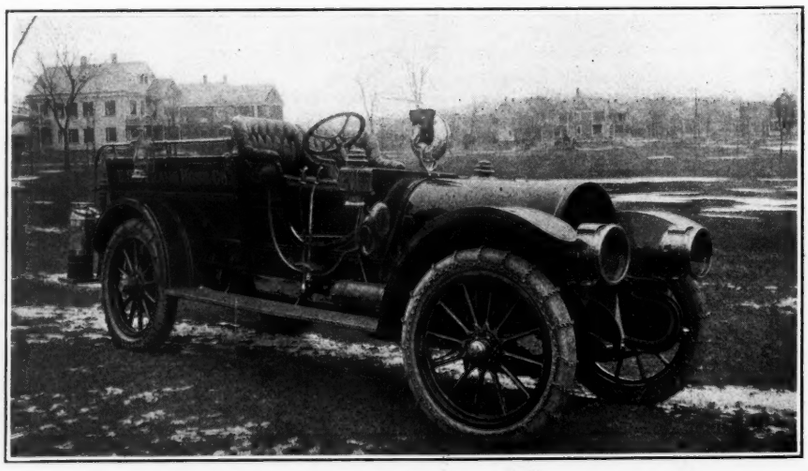
Franklin, Mass.—The new combination hook and ladder truck, which the town voted to purchase at a special town meeting, Nov. 20, 1911, and which the selectmen contracted for shortly afterward with the Combination Ladder Company, of Providence, has arrived from Providence, and is now housed at Ray engine house. The new apparatus is a valuable equipment to the Franklin fire department and is of the most modern make, and altogether something in the way of up-to-date apparatus for the fighting of fire that the citizens of Franklin may well take pride in. It makes a fine appearance, with its red-painted body and running gear, with the legend "H. & L. Truck No. 1" in gilt letters on either side. The new apparatus, which was built faithfully according to specifications as contracted for by the town, has a Seagrave truck with Seagrave equipment. The length of frame is 70 feet, and the wheels are of the Archibald pattern, with rubber tires and band brake. The truck is built with a truss frame, and the ladders are of truss pattern. There are altogether nine ladders, including one 45-foot extension ladder, two 28-foot wall ladders, one 28-foot and one 25-foot extension ladders. The chemical engine, which is underneath the frame near the front end of the truck, is of two-tank Hollaway type, each of the tanks of 25 gallons and connected with chemical hose 200 feet in length. There is a full modern equipment of tools, including insulated wire-cutter, mauls, underwriters' patrol covers, door-openers, plaster-hooks, wall-picks, tin-roof cutters, scoops, hay forks, etc. Chief Engineer Metcalfe and the firemen have the new apparatus in readiness for service. The cost of the combination hook and ladder truck is $1,750, together with the old truck and the old hand engine.

Quanah, Tex.—An automobile fire engine has arrived and been put to the test on the muddy streets. The city has ten days in which to try it before acceptance.

Schenectady, N. Y.—Fire Chief Yates and Commissioner of Safety Cole have returned from Providence, R. I., and Springfield, Mass., where they inspected tractors used in the fire departments in those cities. The two officials have collected considerable data regarding tractors which will be submitted to the Board of Contract and Supply before proposals for the tractor to be used here are solicited.

Newark, N. J.—Apparently the horse in the Newark Fire Department is doomed. While no definite action has been taken by the Fire Board on this point, the commissioners have agreed among themselves that all apparatus to be purchased in future shall be of the motor-driven type. For a year the local department has been proving that a motor-driven engine is beyond the experimental stage by the use of the machine in Vailsburgh. The new engine purchased last week and installed in the quarters of No. 13 company, at Summer avenue and Halleck street, indicates the department's faith in this style of apparatus. The new double company quarters being completed at Avon avenue and South Thirteenth street will be a step further toward working out this general scheme. Not only is a motor-driven engine to be placed there, but the commissioners have determined on a motor hook-and-ladder truck as part of the equipment. In order to determine on the best type of truck to purchase, the members of the board have planned to visit nearby cities, where apparatus of this nature is in use. Some time ago Chief Sloan recommended that a new aerial truck be purchased, to replace the one in No. 1's quarters, in Mulberry street. This machine is out of date, and, according to department experts, liable to break down at any time. In all probability the new machine will be of the motor-driven type. The department also has an automobile for use of the chief and three automobile repair wagons. When the budget is made up, the board will ask for funds to purchase a car for the deputy chief and possibly one for each of the battalion chiefs. A high pressure auto-wagon is also very much desired by Chief Sloan, for use in the centre of the city. This car would be capable of carrying hose and a company of men to a fire and getting the high pressure pipes going long before an engine could get to a hydrant and have a working stream available for fire-fighting purposes.

Mechanicville, N. Y.—The accompanying picture illustrates the auto fire truck purchased by the E. H. Strang Hose No. 3 Company with funds from the company's treasury. The chassis of a six-cylinder Franklyn automobile was donated by friends of the company. The car is painted a bright vermilion, with trimmings of black and gold. It is a 42-horsepower, weighing 3,800 pounds and carries 600 feet of hose, axes, bars, winches and emergency surgical dressings. Later it is expected to be equipped with a 40-gallon chemical tank and two three-gallon hand extinguishers. It has been given a number of severe tests and has proved very satisfactory.



Courtesy Dr. Wm. Van Doren
E. L. STRANG HOSE CO. NO. 3, MECHANICVILLE, N. Y.

GOVERNMENT AND FINANCE

Moorhead Amends City Charter

Moorhead, Minn.—By a vote of 415 to 35 the Moorhead city charter has been amended, the amendment providing the granting of a twenty-five-year franchise to corporations instead of twenty-year periods as formerly. In consideration of the new franchise to be granted to Fargo and Moorhead Street Railway Company under the new amendment the company has agreed to extend its lines to Dilworth, a distance of four miles, providing transportation to and from work for the heads of 250 families residing here who otherwise would have to remove their residences to Dilworth. Construction will start early this spring.

Grand Rapids Proposed Charter Defeated

Grand Rapids, Mich.—Grand Rapids' proposed new charter incorporating the initiative, referendum and recall, civil service, control of rates of public utilities and non-partisan elections was defeated by a majority of 1,282. A total of 12,474 votes was cast, about two-thirds the normal vote at a regular election.

Commission Files City's Budget for 1912

Salt Lake City, Utah.—Providing for a total expenditure of $1,494,396.75 in running the city during 1912, which is an increase of $172,798.45 over the expense for 1911, the city budget for the present year has been completed by the city commission. One of the largest items of increase in the budget is the appropriation for public improvements. The commission provided a total of $232,850 for improvement work, including street work, water extensions, park and boulevard improvements and general improvements to be made in the other departments. This figure is $49,615 more than the amount used for street and public improvements during the previous year. A contract binding P. J. Moran to spend $10,000 in the construction of a playground in City Creek Canyon in return for the privilege of maintaining his asphalt plant in the canyon another year has been signed by the contractor and was approved by the commission. Moran agreed to construct a well-equipped playground just east of his plant on the flat between it and the creek, to plant it with grass, trees and shrubbery and to line the roadway with trees from the entrance to the canyon to the playground. The park is to be known as the "Moran Playgrounds." The contractor was put under bond to fulfill his promise.

Commission Plan Rejected

Adrian, Mich.—After one of the most strenuous campaigns in the history of municipal affairs in the city the Adrian commission plan charter was defeated by a majority of 10 votes. A total vote of 1,970 was registered, showing the keen interest taken by both parties in the election. The factions were lined up nearly on party lines, the Democrats opposing the commission plan. There is talk of a recount to determine the result. The commission plan was defeated after a campaign of three years waged by its advocates in the city. Two years ago charter revision was held up by the council, which refused to vote an appropriation after the city had voted for revision. The council was sustained in the circuit court, but the decision was reversed in the supreme court, which issued a writ of mandamus forcing the appropriation.

Will Have Municipal Audit

Bridgeport, Conn.—The city of Bridgeport has taken steps toward putting the affairs of the muicipality upon a business basis. The budget for 1912 contains an item of $20,000 for the expenses of a "committee on audit" recently appointed by the mayor, and this committee has assigned the work to Peter White, C. P. A., of St. Louis. Mr. White was formerly associated with Haskins & Sells, C. P. A.'s, of New York, the Bureau of Municipal Research of New York, and the Merriam Commission on City Expenditure, of Chicago. He has also conducted an investigation of the affairs of the city of St. Paul. He is now consulting accountant of the Chicago Bureau of Public Efficiency and of the Milwaukee Bureau of Economy and Efficiency, and he is in charge of the Bureau for Revision of Accounts and Methods of the comptroller's office in St. Louis. The members of the committee of audit are John Taylor, C. A. Scot, W. P. Allen and J. H. Green.

STREET CLEANING AND REFUSE DISPOSAL

Will Inaugurate Spotless Town Campaign

Portland, Me.—The Portland Board of Health has been making strenuous efforts to get a movement started in Portland to clean house. In other towns such a proposition has worked out with great success, and as the springtime came these towns that have aspired to be "spotless towns" have inaugurated an organized campaign as a result of which the backyards and foul places in the cities have all been cleaned up prior to Easter. The Board of Health is to undertake such a campaign in Portland. It is backed up by the Civic Club, and invitations have already been sent to some 30 different organizations in the city asking for co-operation and assistance in the work.

Police Will Aid in Clean City Move

Baltimore, Md.—To make Baltimore a cleaner city the police will co-operate with the Women's Civic League and policemen will be instructed to tactfully warn householders of the penalties attached in violating the laws that look to a clean and sanitary city. The co-operation of the police in making a "cleaner Baltimore" will come about because of a conference held by Miss Harlean James, of the Women's Civic League, with the Board of Police Commissioners. At the close of the conference President Wheltle said that the orders to the police would be issued immediately. Miss James suggested that policemen visiting householders should explain to them without too much abruptness the ordinance and its meaning. "And it is a splendid suggestion," said the president of the board. The ordinance is as follows: "It is unlawful to deposit any hoop, wire, glass, boards with nails in them, or nails of any kinds which may be dangerous to horses' feet; or any dead animal, manure, offal, garbage, ashes, fruit, skins, dirt, filth, shavings, noxious fluid or substance, oyster or clam shells, paper or refuse of any kind into any gutter, street, lane or alley, wharf or any other public place. Penalty, fine $2 to $10, or imprisonment in jail not exceeding five days.

Clean-Up Week for City

Spokane, Wash.—Clean-up week in Spokane this spring will close by the people observing Arbor Day, April 11, and Good Roads Day, April 12, as determined in proclamations issued by Governor Hay. Mayor William J. Hindley announces that the plans for making Spokane more beautiful will be different from anything yet attempted in this city, which originated the cleaning week idea six years ago, when 20,000 men, women and children participated in the work. This year it is planned to have a working agreement with the municipal crematory and the health department and divide the city into districts, in each of which city inspectors will be stationed to see that the work is thorough. Crews from the crematory department will gather the refuse at the expense of the householders. The Spokane Realty Association has undertakn to place all vacant lots and all unappropriated and unimproved lands in the city park system under cultivation without expense to the owners. Every family and all the school children in Spokane may thus have vegetable gardens without the expenditure of a single penny for work or seeds.

To Sprinkle Streets with River Water

Dayton, O.—Street sprinklers during the coming summer will have to furnish the water for this purpose—that is, they will have to do their own pumping from the river and not take the water from the hydrants that draw upon the city wells, according to the statement of City Engineer Cummin. Calculations have been made that 147,000 gallons of water have been used daily in the past for this purpose and it is the opinion of the city engineer that the wells cannot withstand such an onslaught as this during the coming sprinkling season. The private pumping system will entail greater expense for sprinkling in the future than in the past, inasmuch as the water will have to be hauled greater distances. Regardless of this fact, however, it is said that the present water situation is such that all available means will have to be employed to conserve the supply and a plan whereby 147,000 gallons can be saved daily cannot be overlooked. The water for sprinkling purposes will be taken directly from the river at convenient places.

RAPID TRANSIT

Pay-Enter Plan To Be Used

Toledo, O.—Patrons of the Rail-Light will be dropping their fare into money boxes on the back platform of pay-as-you-enter cars within a few months. Several of this type of cars, which have been in use, have been prepared for the change except by the installation of fare boxes. President F. R. Coates said that all the cars owned by the company are being transferred to the pay-enter type as rapidly as possible, and within a short time there will be about 50 cars in readiness. The contract for 20 new cars will be let in a short time and they will be of the pay-enter type.

Gas-Electric Line to Connect Mobile with Pensacola

Pensacola, Fla.—According to news which has reached here from Mobile and points in Baldwin county, Alabama, this city and Mobile will be connected by a gas-electric car system in the near future, promoters of such a line having already put surveyors in the field with the view of selecting the best right-of-way possible. This line will run as far from Pensacola toward Mobile as the eastern shore of Mobile bay, and there fast motor boats will be used in crossing the bay and reaching Mobile. Such a line would pass through the rich truck gardening section of Baldwin county, crossing Perdido bay near Lillian and coming direct to this city without having to cross any streams of any consequence. Former City Engineer Proctor, of the Big Four, is among the promoters, who are said to have capital to carry the project to a successful termination.

City Officials Inspect Cambridge Subway

Boston, Mass.—About 350 persons, including Governor Foss, Lieutenant-Governor Luce and Boston officials inspected the new $11,000,000 Cambridge subway from Park street to Harvard Square as guests of the Boston Transit Commission and the Boston Elevated railway. When the trip was over all said that what impressed them most was the great speed of the train and the quietness with which it runs. The large stations also brought forth their admiration. In Harvard Square connection is made with the surface lines running to points beyond. The Harvard Square station has been planned to avoid confusion by separating the passengers arriving from Boston and those who are bound for Boston. A passenger arriving in Harvard Square who wishes to continue his journey by a surface car on leaving the subway train keeps directly on down the platform and then down an inclined plane to the platform, where he awaits the surface car he seeks. The Cambridge subway, the work on which was begun on September 29, 1909, will cost about $1,300,000.

Street Car Traffic in Shanghai, China

Shanghai, China.—The tram cars of Shanghai carry more passengers per mile than is done in London or New York. This is a bold statement, but it is made on the authority of the Tramway Company of Shanghai. The present motor trams of the company are inadequate to meet the heavy traffic of the settlement and 25 new style cars have been ordered and will be running before the end of the year. The reason why the traffic has increased is that the fares have been reduced so that the trams compete more effectively with the old-fashioned rickshaw, which, however, will continue to have its place in China, as this vehicle operates in thoroughfares untouched by the tramway. According to the manager of the Tramway company, Mr. McColl, the street car traffic of Shanghai is heavier than anywhere else in the world, including New York and London. In America, he declares, they haul only between six and seven passengers to the average car mile, and in London they do not exceed nine, but in Shanghai between 1 and 14 are carried to the car mile.

Side Door Surface Cars

New York, N. Y.—Engineers of the Interborough-Metropolitan Company have been constructing a new car of special type which will be used on the surface lines in a short time. The new car will be 55 feet long, excluding the end doors and platform, and the entrance and exits will be through large side doors. So far as is known the pay-as-you-enter system will be used on it. It will have a seating capacity of 52 persons.

MISCELLANEOUS

Engineer Reports on Concrete Harbor Work

Los Angeles, Cal.—In a report to the advisory committee of the Bureau of Harbor Improvement, Homer Hamlin, city engineer, gives the result of his recent visit to San Francisco at the city's expense to investigate the conditions of concrete construction in the harbor there. Some of the concrete, he concludes, has been seriously disintegrated in sea water. He admits, however, that at least some of the disintegration was hastened by poor work done originally. The report concludes as follows:

"In cases where the mud line is lower than the bottom of the wood forms, the concrete is directly exposed to sea water. One naturally looks for a maximum of disintegration here. The divers' report indicates that this is the case. In conclusion, I will state that it is impossible for me, or anyone else for that matter, to point out to a certainty where, in this case, poor work was the primary cause of disintegration, or, on the other hand, where decomposition of cement was the prime cause of failure. Porous concrete or concrete deposited through salt water, is prone to disintegrate later. It is only fair to state that many of the supports of the piers where defective concrete was found, are practically sound above low tide level, some being rather soft, however.

"I will state, further, that in my opinion some of the concrete structures in San Francisco harbor have been seriously disintegrated by sea water, and further, that the failure has been hastened, in some cases at least by the poor work done originally. I do not believe, however, that poor work is responsible for all the failures. Concrete does not always fail quickly, sometimes not for several years. The next few years will show conclusively whether or not the supports which now appear sound will remain so. None of the supports—even those under the ferry buildings—have been in long enough to settle the question definitely."

Army Post To Be Used as Park

Pittsburgh, Pa.—Arsenal Park has just been re-leased for a five-year term to the city of Pittsburgh by the United States Government. The site was a military post for nearly a half century. It covers a tract of about 30 acres and is leased to the city at a nominal rental of $5 per year.

Massachusetts to Consider Needs of Motor Trucks

Boston, Mass.—Massachusetts will take into account in its future road work the needs of the delivery truck, and highways will be constructed to aid these phases of commercial activity. In what direction this work will move is not yet known, but one phase of it is to be the city approaches from important trunk lines, the neglect of which is known to every motorist. This work is highly important, and the lead of the Bay State will be watched elsewhere with keen interest. The rural communities of this State, where the chief opposition to the automobile has always been manifested, do not seem to have given much thought to the truck side of the situation. The development of the motor truck is hardly less important to rural sections than to urban, yet it is not realized that a blow at the pleasure motor car is also a blow at the truck, a hampering of one of the present day industrial advancements.

Moth Fight Cost City $375 Weekly

Lowell, Mass.—It is costing the city of Lowell about $375 a week to fight the gypsy and browntail moths, and it isn't a "finish fight" at that. It is possible to subdue the moths and stem the tide of their onslaught to a certain extent, but to annihilate them—never! There are thirty-two men at work in Lowell to-day treating gypsy moths to poison and destroying the browntail's nests. The gypsy moth is the greater pest of the two. One may know where to look for browntails, but one can never tell where the gypsy lives. It was only the other day that the moth men found tin cans on a dump filled with gypsy moths. The Oakland Improvement Society is doing good work in the Oaklands, cutting down underbrush and scrub trees, and after they have finished the city forces under Superintendent Whittet will go in and attend to the moths. He says: "With the exception of the Oaklands, Belvidere has been pretty well attended to and we have gangs working in different parts of the city. We are also doing considerable work for property owners whose trees are infested. We treat the gypsy moths with creosote and we cut the browntail's nest from the tree and send it to the crematory. We sent about three tons of moths to the crematory last year, and believe me it takes a pile of moth nests to make a ton." The municipal council has appropriated $5,000 for the destruction of moths, and at the rate that the moth department is going at the present time with a weekly payroll of $375 and a portion of the appropriation already expended, it will not require many more weeks to exhaust the appropriation.

LEGAL NEWS

A Summary and Notes of Recent Decisions—Rulings of Interest to Municipalities

Invalid Contract—Remedies

Laird Norton Yards vs. City of Rochester—Owing to informalities, a contract attempted to be made between plaintiff and defendant, a city under a home rule charter, was invalid. Thereunder coal was delivered by plaintiff to the city electric light plant for three months, and the coal consumed as delivered. Held that, the attempted contract being within the power of the defendant to make, plaintiff, upon the pleading and proof, was entitled to recover upon a quantum valebant for the coal received and consumed by the city.—Supreme Court of Minnesota, 134 N. W. R., 644.

Care of Streets

Sundell vs. Village of Tintah.—The rule applies to all streets within the borders of the municipality, whether in the settled or platted part thereof or in the outlying districts, with the qualification or limitation that the same diligence and care is not required in respect to streets remote from the settled part of the municipality.—Supreme Court of Minnesota, 134 N. W. R., 639.

Patents—Water Main Cleaner

National Water Main Cleaning Co. vs. Whitney Pipe Cleaning Co.—That Letters Patent of the United States No. 934,520, issued to H. A. Creenan, for device for passing cables through water pipes, and assigned to the complainant, are good and valid in law, especially as to claims 3, 4 and 5 thereof. That a perpetual injunction issue out of and under the seal of this court directed to said defendants, an each of them, restraining them and the associates, servants, agents, attorneys, clerks and workmen of each of them and the officers and directors of the Whitney Pipe Cleaning Co., and every person acting for or on behalf of said defendants, or either of them, from any construction, sale or use in any manner of the said patented device for passing cables through water pipes or any part thereof.—United States District Court for New Jersey.

Presentation of Claims—Verified Statement

Frank vs. City of New York.—The words "verified statement," in Greater New York Charter (Laws 1901, c. 466), section 261, providing that a verified statement of claim shall be filed with the comptroller, relate to the statement which a claimant must file, showing in detail the property alleged to have been damaged or destroyed and the manner thereof, and do not refer to a verification of a claim on an examination conducted by the comptroller as authorized by section 149.—New York Supreme Court, 133 N. Y. S., 434.

Regulation of Sale of Milk

State ex rel. Niles vs. Smith, City Jailor—The city of Jacksonville may regulate the sale of milk within its territorial limits, and require a license tax therefor.—Spreme Court of Florida, 37 S. R., 426.

Taxes to Pay Bonds—Injunction

City of Marshall vs. Elgin.—Where a city is estopped to assert as against bona fide holders the invalidity of bonds issued for an improvement, taxpayers cannot defend against taxes to pay the bonds; and, in an action by them to enjoin collection of taxes, they have the burden of proving the bonds are not in the hands of such holders.—Court of Civil Appeals of Texas, 143 S. W. R., 671.

Police Regulations—Validity

Cotton vs. City of Atlanta—Though there are circumstances under which the same physical act may render the actor guilty of two offenses, one of which may be a municipal offense, and the other a State offense, still the municipality cannot punish for State offenses. Where a municipal penal ordinance and a public criminal statute operate upon the same set of physical acts, the municipal ordinance is invalid, unless the offense created by it contains some characterizing ingredient not contained in the offense under the State law.—Court of Appeals of Georgia, 73 S. E. R., 683.

Contracts—Competitive Bidding

Johnson v. Atlantic City et al.—Where proposals under a city charter that calls for competitive bidding are purposely so framed that under the circumstances they deter rather than invite bona fide competition, an award to the intentionally favored bidder will be set aside.—Supreme Court of New Jersey.

Streets—Defects

Braunstein vs. City of Louisville—Where a rock quarry was a part of a municipal workhouse, and, owing to the negligence of the officers in charge thereof, improper blasts were set off, which cast stones in the street and injured plaintiff, the municipality was not liable, on the theory that the casting of such stones was a defect in the street.—Court of Appeals of Kentucky, 143 S. W. R., 373.

Sewage—Nuisance

Stamford Sewerage Co. et al. vs. Astin.—One seeking to recover damages to his farm and place of residence and for personal inconvenience occasioned by the operation of a sewer system for a city, whereby refuse matter is discharged a mile or more from his residence, must allege and prove either negligence in the construction and operation of the system, or that it is a nuisance, public or private.—Court of Civil Appeals of Texas, 143 S. W. R., 649.

Defective Drains—Negligence of Officials

Board of Councilmen of City of Frankfort vs. Buttimer.—Where a servant of a city, in attempting to remove an obstruction in a sewer which caused the flooding of plaintiff's cellar, tried to force water through the sewer, and thus increased the amount of water in plaintiff's cellar, the city was liable for his negligent act.—Court of Appeals of Kentucky, 143 S. W. R., 410.

Defective Street—Actions—Evidence

Willis vs. City of Browning.—In an action against a city for personal injuries from a defect in a board crossing, evidence that, shortly after plaintiff's injury, the city took out the board crossing and substituted one of cement, was inadmissible to show culpability on the part of the city; but, where a model of the old crossing was shown to the jury, such evidence was admissible to show that the model was not taken from the crossing, but was made from memory.—Kansas City Court of Appeals, Missouri, 143 S. W. R., 516.

Water Companies—Rates—Reasonableness

Des Moines Water Co., vs. City of Des Moines—A water company in Des Moines, Ia., held entitled to earn dividends equal to 8 per cent. on the value of its plant, in view of the hazards of the business and the current rates of interest in the State; and an ordinance fixing rates under which it could not earn anything near such returns held unreasonable and confiscatory, and its enforcement enjoined.—United States Circuit Court, 192, F. R., 193.

Street Lighting—Authority to Contract

Fowler vs. Town Council of Town of Fountain Inn et al.—A contract between a town and a corporation to light the streets of the town for a period of ten years is of the nature of a bond debt, which, under the Constitution, cannot be created without the sanction of a majority of the qualified electors of the town.—Supreme Court of South Carolina, 73 S. E. R., 626.

Streets—Injuries from Defects

Riley vs. Kansas City—It is the duty of a municipal corporation to keep the space between the curb and the property line in a reasonably safe condition. Where, in an action against a city for injuries from a defective meter covering, there was no evidence that the meter top had been displaced by boys while playing, an instruction thereon was properly refused.—Kansas City Court of Appeals, 143 S. W. R., 541.

Sewers—Injury to Property

Toebbe et ux. vs. City of Covington—A property owner, whose property was temporarily damaged by a city negligently permitting a sewer to become stopped up, causing the water to flow back into his cellar, could recover such sum as would fairly compensate him for the cost of disconnecting the cellar from the sewer and for any diminution in value of the property arising solely from the water flowing back.—Court of Appeals of Kentucky, 141 S. W. R., 421.

NEWS OF THE SOCIETIES

Association of Vermont Engineers

At a meeting at the Hotel Vermont, Burlington, Vt., March 7, the Association of Vermont Engineers was formed and the following officers elected: President, F. O. Sinclair, of Burlington; vice-presidents, D. Williams, of St. Johnsbury; J. E. Helyar, of Brattleboro; secretary, G. A. Read, of Barre; treasurer, A. E. Winslow, of Norwich. The board of directors will consist of W. H. Vorce, of St. Albans, for three years; H. M. McIntosh, of Burlington, for two years, and A. C. Grover, of Rutland, for one year.

It was decided to take in three branches of members; first the corporate members, who could vote, consisting of members who had either put in four years of actual work or four years at college and two years of experience; junior members who had not as yet qualified in this manner, and associate members, consisting of all others who for various reasons were interested in engineering projects.

At a banquet in the evening the principal speaker was M. G. Barnes, of Albany, N. Y., a member of the advisory board of consulting engineers for the improvement of canals, who spoke of the New Yark State barge canal and its relation to Lake Champlain and Vermont.

The part of the paper of most interest to Burlingtonians was that relating to the value of the barge canal project to this city and State. Mr. Barnes said that Burlington would derive great benefit in the transportation of coal. Burlington is 300 miles from New York. Coal could be delivered here from that city in a fleet of steel canal barges for about 50 cents per ton if 117,000 tons were needed and the city did not have to pay middlemen's profits. The cost is now approximately $3 per ton. Mr. Barnes said that with the ship canal the northern terminus should be Lake Superior, as the Canadians were alive to the value of canals, and would soon have a network perfected which would allow intercourse with the large Canadian cities.

C. C. Covert, engineer of the United States geographical survey, spoke briefly upon the value of the collection of data in regard to Vermont's streams, their average flow, with a view to obtaining information as to water sheds and power plants.

Atlanta Association of Members of the American Society of Civil Engineers

Members of all grades of the American Society of Civil Engineers met at the University Club, Atlanta, Ga., and organized a local chapter. In accordance with the by-laws adopted, the oldest member was made chairman. This is Arthur Pew, consulting engineer (1885). W. A. Hansell, principal assistant engineer of the Sewer Department, was made secretary.

The chapter appointed on the executive board Alex. Bonnyman, general manager and chief engineer of the A. B. & A. R. R., and James Nisbet Hazelhurst, consulting municipal engineer. The regular meetings of the association will be held on the last Saturdays of December and June, and the first of these will be known as the annual meeting.

American Water Works Association

Fred S. Bates, chairman of the exhibit committee of the Water Works Manufacturers' Association, has issued the following notice:

It is the desire of the Water Works Manufacturers' Association to make the exhibit of the various water works appliances used in connection with the construction of water works one of the special features of the American Water Works Association's annual convention, which is to be held in the city of Louisville, Ky., the week beginning June 3, 1912.

We have made arrangements to partition off the convention hall, which is located on the top floor of the Hotel, for exhibit purposes, thus giving a large, light, airy exhibit room with ample space for all exhibits.

We particularly call your attention to the fact that if it is your desire to submit an exhibit at this convention you should make your application for space immediately, giving the number of square feet required on floor or table for your exhibit so that we may provide you with table space or floor space only. All tables will be neatly constructed and covered with muslin.

No exhibitor will assign, sub-let or apportion the whole or any part of the space allotted, nor exhibit therein any other goods than those manufactured or sold by the exhibitor in the regular course of business.

Signs will consist of the names of space occupants and a brief description of goods, illustrating the character of exhibits, size about 18 inches x 30 inches. In making application for space please state the lettering or wording you wish on your sign, as we desire to have them uniform and complete on your arrival at Louisville.

In shipping exhibits all goods must be plainly marked and addressed to the American Water Works Association, care of Seelbach Hotel, Louisville, Ky. Under no circumstances will goods be received on which there are any charges of any kind. All shipments must be prepaid. The management will not be responsible for loss or damage to the goods consigned in its care. The exhibits will be placed at the various spaces designated at the expense of the management.

Exhibits must not be removed from the exhibit room during the progress of the convention, except upon written permit from the management.

All points not covered by these rules are subject to the decision of the executive committee.

If you have not applied for space please do so at once by writing to Fred S. Bates, 180 Broadway, New York City.

Pacific Association of Consulting Engineers

This association was recently organized at San Francisco, with a charter membership of 22. The objects of the association as given in the constitution are the maintenance of a high professional standard among its members, the promotion of a code of ethics, the formation of a schedule of charges and the advancement of engineering knowledge. A code of ethics and a schedule of charges have been prepared. The officers of the society are as follows: President, A. L. Adams; vice-president, C. D. Marx; secretary-treasurer, C. Derleth, Jr., University of California, Berkeley, Cal.; board of governors, the above named officers, together with C. E. Grunsky and J. H. Wallace.

Louisville Commercial Club

Mayor Samuel Lewis Shank, of Indianapolis, will be invited by the Louisville Commercial Club to be the principal speaker at an open meeting to be held March 15 at the Seelbach. The invitation was formally authorized at a meeting of the Commercial Club directorate at a dinner Feb. 29 at the Tavern Club. Mrs. Shank will also be included. The Mayor will speak on "The High Cost of Living."

The matter of renewing the present charter of the Commercial Club, which will expire soon, was considered at this meeting.

The block system of city beautification was indorsed at a meeting of the Commercial Club at which representatives of that organization's Civic Development Committee and of the City Beautiful Committee of the Real Estate Exchange, the Woman's Outdoor Art League, the Highland Civic League, the Civic League of Crescent Hill and the Southeastern Improvement League were present. Dr. Henry E. Tuley, of the Commercial Club, presided.

Dr. Tuley presented a plan for decorating light standards with flower baskets similar to those in Antwerp. Col. Fred Levy, of the Park Board, pledged its assistance in beautification plans. Pendleton Beckley, of the Board of Public Safety, asked co-operation in the enforcement of the weed ordinance. Mrs. Mason Maury's forestry bill was indorsed.

National Municipal League

Secretary Clinton Rogers Woodruff has announced that the next annual meeting will be held in Los Angeles, July 8 to 12.

The league has established an annual prize of $20, called the "Cincinnati Prize," to be awarded to the student in any department of the University of Cincinnati who submits the best original essay on a subject bearing upon the municipal government or the civic life of the city of Cincinnati. The subject selected for the 1912 competition is "Municipal Civil Service Reform." Essays submitted should contain (a) an analysis of the laws of Ohio relating to the civil service of cities: (b) a critical review of the manner in which such laws have been administered in the city of Cincinnati; (c) a comparison as to efficiency between the Civil Service Commission of Cincinnati and similar commissions in other Ohio cities; (d) notices of good features in civil service laws governing other American cities which are not embodied in the municipal civil service laws of Ohio; (e) a discussion of the practical operation of municipal service laws, together with suggestions for their improvement and better administration. The essays must not exceed 10,000 words and must be mailed not later than May 3, addressed to Prof. Robert C. Brooks, University of Cincinnati, Cincinnati, O., and marked "For the Cincinnati Prize." Competitors must mark each paper with a nom de plume and enclose in a sealed envelope the full name, address, class and department of the university corresponding to such nom de plume.

Engineers' Society of Western Pennsylvania

At a meeting of the structural section of the Engineers' Society of Western Pennsylvania, March 5, John A. Ferguson, assistant engineer of the Bureau of Construction, read a paper on "Recent Practice in Concrete Bridge Building by the City of Pittsburgh."

Mr. Ferguson stated that Pittsburgh has 89 bridges, constructed under the jurisdiction of the Bureau of Construction, comprising nearly every well-known type of bridge. Nine of them were built by various public service corporations and turned over to the city for maintenance. Twenty have been built and are maintained by such corporations, the city having power to cause them to be repaired when necessary. Sixty were built and are maintained by the city at its own cost.

Of the 89 bridges, seven are wood, 71 are of steel, five are of stonemasonry and six are of reinforced concrete. Two more reinforced concrete bridges, the Atherton avenue and the Larimer avenue bridges, are now under construction. The Larimer Avenue Bridge has the longest span of any bridge in America, covering 312 feet.

Mr. Ferguson stated that reinforced concrete lasts longer and looks better than any other construction. The first cost of such a bridge is greater than one built of steel, but in the end the city is saved money through the reduction of the paint bill, which for bridges alone now averages $43,000 annually. There is not a single item on record for the repair of a stone or concrete masonry bridge on account of deterioration of material. Lantern slides were used to illustrate Mr. Ferguson's paper.

Civic League of St. Louis

The bi-weekly bulletin of the League for February 26 contains the following statement of progress in the League's program for 1912:

For Good Government:

1. A new charter—a new committee just started to work.

2. A municipal efficiency bureau—a conference with Dr. Cleveland and Mr. Allen to determine what action will be taken, to be held on February 28.

For Public Health:

3. A new tenement house code—in preparation.

4. A better regulation of the milk supply—ordinance printed and submitted to the Board of Health.

5. Appropriation for the collection of rubbish and ashes—campaign now being conducted looking to the indorsement of an appropriation by the various civic organizations.

6. The ventilation and heating of street cars—tests completed and further negotiations with the street car company pending.

7. A strong municipal department for smoke abatement—ordinance submitted to the Board of Public Improvements, which has prepared a comprehensive code for introduction into the Assembly.

For the City Beautiful:

8. A vote in November, 1912, for the Outer Park District—campaign in preparation.

9. An exhibition of local art and architecture in June, 1912—in preparation.

10. Education of citizens in tree planting—preparation for spring campaign under way.

11. Removal of overhead wires—ordinance prepared and submitted to the Board of Public Improvements.

12. A further campaign against signs and billboards—overhead signs bill defeated. Billboard litigation in the U. S. Supreme Court.

For Social Service:

13. A parole board to handle police court paroles—ordinance prepared ready for submission.

14. The proper care of homeless men—work has been taken over by the city.

PERSONALS

BUTLER, HARVEY M., Suffolk, Va., has resigned as Chief of the Fire Department.

CARMICHAEL, COL. JAMES H., Lowell, Mass., has been appointed local secretary of the Civil Service Commission.

CARROLL, M. C., Mount Vernon, N. Y., has been appointed to the office of Superintendent of the Sewage Disposal Plant, to succeed Chas. A. Hammond.

CORINGS, FRANK, Perth Amboy, N. J., has been appointed Fire Chief.

DAVIS, ISAAC N., El Paso, Tex., has been appointed Chief of Police to succeed Ben. F. Jenkins, resigned.

DECKMAN, CHAS. J., Cleveland, O., has been elected President for the second time of the National Paving Brick Manufacturers' Association.

DE HAVEN, CLARK, Bluffton, Ind., has been appointed General Superintendent of the Municipal Water Works and Electric plants.

FULLER, GEORGE W., New York City, has been appointed Consulting Engineer of Water Works Improvement at Macon, Ga.

HOULIHAN, DENNIS J., South Hadley Falls, Mass., has been elected Chief of the Fire Department.

GILLESPIE, WM., Salt Lake City, Utah, has been selected for the position of Assistant Supervisor of Streets in the Street Department under W. J. Tuddenham, Street Supervisor and head of the department.

MCCABE, R. J., Bessemer, Ala., has been appointed Chief of Police.

MELIA, THOMAS, New York, first assistant to D. D. Jackson in the New York water department bacteriological laboratories, has been retained by the Cleveland Water Works Department to test water conditions at the Kirtland pumping station.

MORRIS, J. F., Portland, Ore., has been employed as City Engineer for Junction City, Ore.

NELSON, DR. ROBERT, Birmingham, Ala., health officer of that city, has been appointed member of the Chamber of Commerce committee on the abatement of the smoke evil and other nuisances.

NOLEN, JOHN, Cambridge, Mass., City Planning Expert, has been retained by the City Planning Committee of Erie, Pa., to take up work of practical planning for physical development of Greater Erie.

O'CONNOR, JOHN J., St. Paul, Minn., has tendered his resignation as Chief of Police. Mr. O'Connor has served nearly thirty-one years in the department in various capacities.

PARKER, JOHN H., Saugus, Mass., has been elected Water Commissioner.

PATTON, G. R., Georgetown, O., Superintendent of the filter plant, has tendered his resignation.

RASINSKY, CHARLES, Cincinnati, O., who has been Assistant City Engineer in charge of sewer construction for many years, has resigned.

ROSE, ASSISTANT FIRE CHIEF, Wheeling, W. Va., has been appointed Fire Chief.

SAWTON, LOUIS C., Haverhill, Mass., has been elected City Engineer.

SCHULTZ, CARL, JR., Little Ferry, N. J., has been appointed Mayor of the borough to succeed his father, who was recently killed in an accident.

SOONEY, DR. R. N., Prescott, Ariz., has been appointed Superintendent of Public Health at Phoenix, Ariz.

STEARNS, FREDERICK P., Boston, Mass., Consulting Engineer, has gone to Johnstown, Pa., to place a valuation upon the holdings of the Johnstown Water Co.

The following Mayors have been elected:

MAINE

Auburn—Dr. C. E. Williams.
Bath—Frank A. Small.
Eastport—Jefferson M. Swett.
Ellsworth—John A. Cunningham.
Hallowell—Emery O. Beane.
Lewiston—Frank A. Morey.
Rockland—George H. Blethen.
South Portland—John A. S. Dyer.
Saco—Frank L. Palmer.
Waterville—William R. Pattangall.
Augusta—Reuel J. Noyes.
Bangor—Chas. W. Mullen.
Belfast—Edgar F. Hanson.
Biddeford—Albert C. Marcille.
Brewer—Victor H. Mutty.

DELAWARE

Seaford—R. W. Robinson.
Georgetown—Chas. S. Moore.
Bridgeville—Wm. P. Short.
Dover—Enoch Clark.

NEW HAMPSHIRE

Berlin—Daniel J. Daly.

NEW YORK

Batavia—Louis Wiard.

VERMONT

Montpelier—James B. Estee.
Vergennes—Chas. A. Caisse.

OREGON

Beaverton—W. E. Pegg.

TENNESSEE.

Rogersville—Gale P. Kyle.

MISSISSIPPI.

Bay St. Louis—R. W. Toulme.

LOUISIANA.

Winnfield—C. M. Bevill.

CANADA.

Montreal—Alderman La Valle.

TEXAS.

Sanger—A. G. Fitzgerald.

Calendar of Meetings

March 28-29.
Southern Appalachian Good Roads Association.—Annual Meeting, Spartansburg, S. C.

March 28-29.
American Society for Testing Materials.—Annual Meeting, New York.—Edgar Marburg, Secretary, University of Pennsylvania, Philadelphia, Pa.

March 28-29.
American Society for Testing Materials.—Annual Meeting, New York City.—Edgar Macbury, Secretary, University of Pennsylvania, Philadelphia, Pa.

April 16-17.
Tri-State Water and Light Association of the Carolinas and Georgia.—Annual Meeting, Salisbury, N. C.—J. W. Neave, Secretary, Salisbury, N. C.

April 18-20.
American Electrochemical Society.—J. W. Richards, Secretary, Lehigh University, South Bethlehem, Pa.

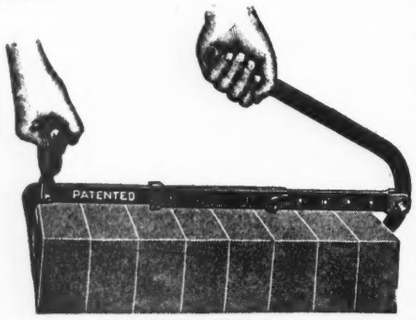
June 3-8.
American Water Works Association.—Annual Convention, Louisville, Ky.—John M. Diven, Secretary, Troy, N. Y.

June 10-12.
Mayors Conference of New York.—Third Annual Meeting, Utica, June 10-12.—Mayor C. C. Duryee, President, Schenectady, N. Y.—C. C. Capes, Secretary, New York.

MUNICIPAL APPLIANCES

Cleveland Brick Clamp

The P. D. Crane Company, manufacturers of builders' iron specialties, 950 East 67th street, Cleveland, O., manufacture a brick clamp which has an extra handle attached, as shown in the illustration. The clamps hold from four paving pricks to twelve regular bricks. The economy resulting from the use of these clamps is well known. The manufacturers state one-third of the time of unloading a car, as compared with the old method, can be saved and that paving contractors save 33⅓ per cent. by carrying bricks from curb to paver instead of wheeling them.



BRICK CLAMP.

The Crane company also makes inspectors' tongs used for removing defective brick from a street. These tongs measure 2 feet 10 inches in height. Salamanders in a variety of types for melting lead for all purposes are another manufacture of this company.

Koehring Hot Mixer

The Koehring Machine Co., Milwaukee, Wis., has placed on the market a "hot mixer" for use in the construction of bituminous pavements. These machines are made either with side loader and side delivery or end loader and end delivery. In general they follow the construction of the Koehring concrete mixer. The heating is accomplished by means of an oil furnace or combustion chamber from which a pipe properly lined to prevent loss of heat leads into the mixing drum. Combustion is complete before the air supplied the small blower reaches the drum. The hot air comes in direct contact with the stone or sand in the drum. The Koehring method of mixing is claimed to be a great advantage in the hot mixer because the material is cascaded about through the hot air. A bituminous mixture in which stone is the aggregate is mixed with comparative ease. A sand mixture as made for sheet asphalt pavements is, however, much more difficult to mix, though by increasing the time of mixing it may be done in a machine designed for stone mixtures. Hence a contractor in selecting a heated mixer, if he expects to use difficult materials to mix, should consider carefully the method of mixing.

The manufacturers state that with this machine stone or sand may be heated and mixed in one and a half or two minutes. These mixers are made in three sizes, mixing 10, 17 and 20 cubic feet of crushed stone per batch, respectively. The boom and bucket used for concrete pavements and bases can be used with the end dumping mixer so as to deliver the bituminous mixture to place and aid in spreading it.

The Koehring company also makes a 350-gallon melting kettle to go with this machine. It is equipped with an oil furnace suspended underneath the kettle. The supply of air is furnished by a blower on the mixer, and the kettle can be placed close to the mixer so that the man operating the side loader can attend to pouring the asphalt or tar into the drum. It is stated that from five to eight gallons of oil per day will operate the hot mixer.

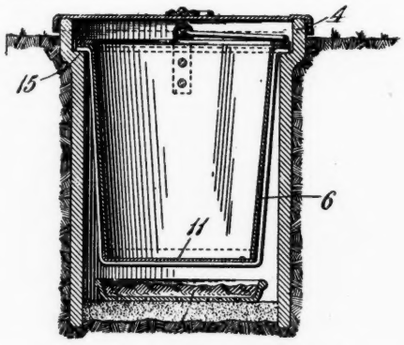
Garbage Receptacle

The Aldrich Manufacturing Co., 75 Pitcher street, Detroit, Mich., manufactures a garbage receptacle which is the invention of Frank Aldrich, who has had charge of the garbage collection in Detroit for the past five years. He has made a study of the different receptacles used all over the United States and offers this as the best. On careful investigation he found that the stationary brick or cement receptacle for garbage became a nuisance in hot weather, because it was not kept clean. Metal garbage cans, although superior to cement or brick, are easily carried away, or do not last long in winter months when the collector has to dig out the frozen garbage, thus making them an expensive receptacle to use.

The Aldrich receptacle is placed underground. A length of large sewer pipe is sunk into the ground and the garbage receptacle is suspended inside of the pipe. There are drainage holes in the bottom of the receptacle which allow all the liquids to drain into a dish filled with lime and into the ground. A metal cover rests over the sewer pipe.

Deep Well Power Head

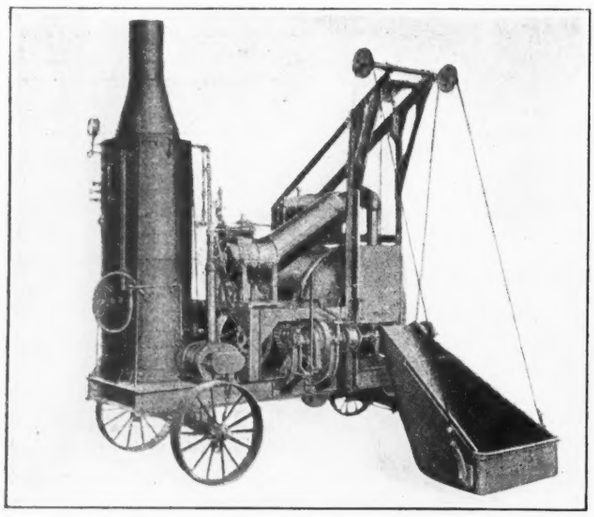
The Deming Co., Salem, O., have placed on the market a new power working head for deep well pumping, which represents quite a radical departure from the usual design. The



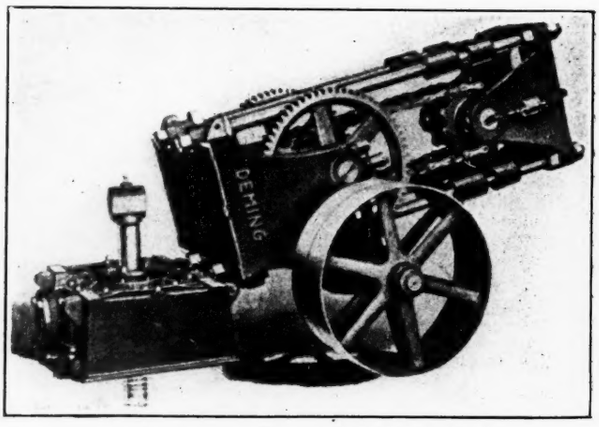
special features of this head are the use of a chain drive, an unusually long stroke and a compact design.

The head is made with strokes 36 and 48 inches long, and if desired longer ones can be secured. This long stroke decreases the number of reversals, and it is emphasized that a corresponding reduction in the trouble with the sucker rods, resulting from frequent changes in the direction of the stroke has been secured. As there is no long throw crank with the resulting side thrust to overcome, the weight of the head is lighter than would be possible with a crank design head having a much shorter stroke.

The power is applied through a single reduction gear to a double chain drive, the up and down strokes being at uniform speed throughout except for a short portion at the ends. The design is compact, the height for a 48-inch stroke head being only 83 inches. It is also possible to gain access to the cylinder and the sucker rod readily by disconnecting the differential plunger from the cross head,



KOEHRING HEATED MIXER FOR BITUMINOUS CONCRETE.



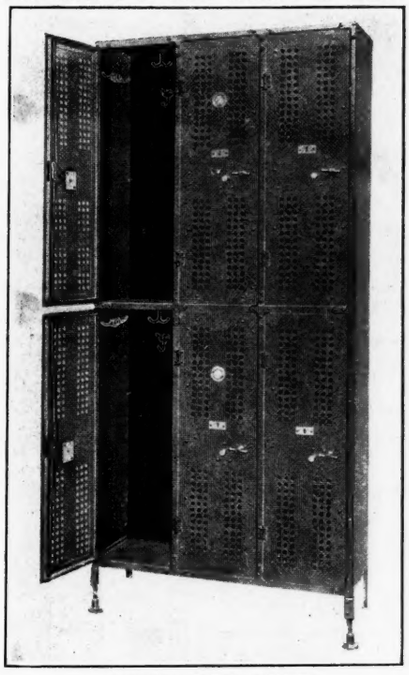
WORKING HEAD FOR DEEP WELL PUMP.

loosening two bolts and swinging the top back, as shown in the cut.

The working head illustrated is designed for a cylinder having a maximum diameter of 7¾ inches and a 4-inch discharge pipe and a maximum plunger load of 3,000 pounds. The speed of the pulley shaft is governed by the plunger speed desired, and for a plunger travel at 120 feet per minute the plunger shaft should operate at 193 revolutions per minute. The standard belt-driven pump is furnished with an air chamber and tight and loose pulleys 24 inches in diameter and 6 inches wide.

Medart Steel Lockers

The Fred Medart Manufacturing Co., gymnasium outfitters, 3529 De Kalb street, St. Louis, Mo., undertook the manufacture of steel lockers in order



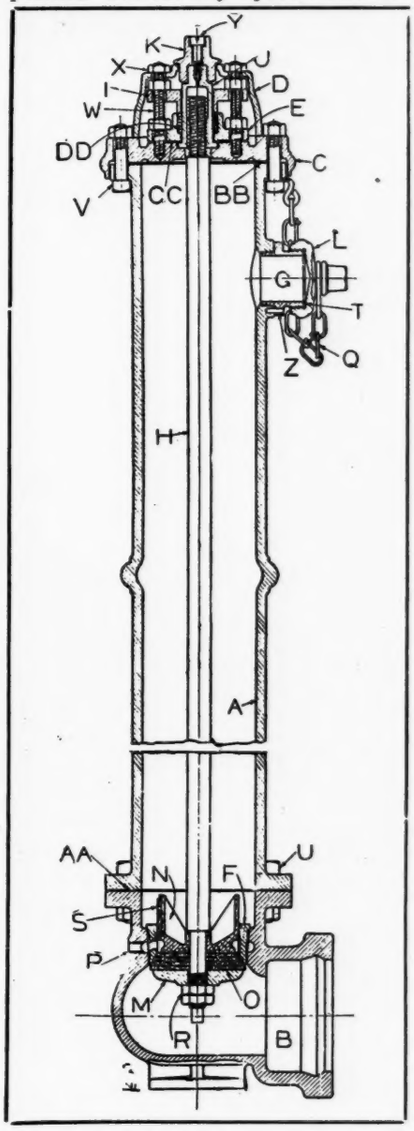
MEDART STEEL LOCKER.

that it might sell in connection with its gymnasium apparatus lockers of equally high grade construction so as not to jeopardize its reputation by handling the goods of other manufacturers which it could not guarantee. The lockers are shipped knocked down, three to a section in single tier style and six to a section in the double tier style. The parts of the lockers are made by gigs and dies so that errors of workmen using rules is eliminated. Moreover, each part is inspected before packing. This practically reduces the price of the locker by making the setting up process easy. All that the workman has to do is to insert bolts in the holes and tighten the nuts; to make this easy proper sized wrenches are furnished. The only other tool required in setting up is a screwdriver. Every part of our locker is made from a standard pattern and every part is interchangeable. Every frame and every door is perfectly square and true. The hinges are fastened to the frame, and the locking device and the lock is attached to the door. The door is fitted in the frame. Frames are made of angle iron; lap-jointed and held together with pressed steel corner fittings. Standard lockers have 6-inch adjustable legs spaced every third locker. This permits of easy sweeping underneath. Doors are secured by a three-way locking device securing it at the top, bottom and side. Handles and latches are made of malleable iron. They are attached to the doors by means of a flat spring and pin. Doors are made of No. 16 gauge steel reinforced with angle iron riveted to the back.

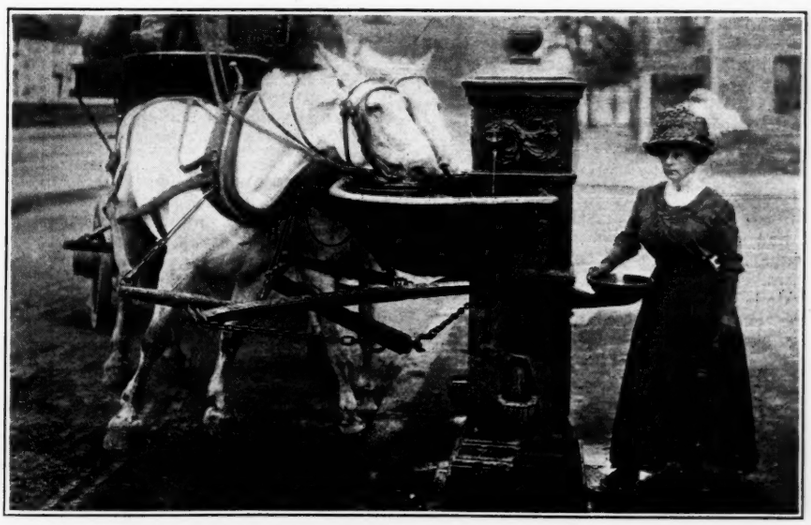
The carrying frames are made of angle irons. The angles in the front frames are 1 x 1 x ⅛ inch. Those in the back frames and those in the doors are ¾ x ¾ x ⅛ inch. The sides, backs, bottoms and tops are made of No. 20 gauge sheet steel. The doors are made of No. 16 gauge sheet steel. This is cold rolled and then pickled. The pickling consists of bathing the steel in muriatic acid to remove the scale. It is then rolled again, which gives the steel a perfectly smooth and glossy surface. Pickled steel costs 30 cents per 100 pounds more than ordinary steel which is commonly used for lockers, but with it a finer and smoother finish is obtained, enough to justify this extra expense. Standard lockers are finished in black enamel, two coats, both baked on. The black enamel finish is recommended because it can be baked on at a higher temperature.

New Hydrant of the Compression Type

The Kennedy Valve & Manufacturing Co., Elmira, N. Y., have placed on the market a hydrant called the "New-type." As will be seen by referring to the illustration the working parts of this hydrant, including the seat ring, are easily removable after the hydrant is connected to the underground pipe, and without disturbing any connections, at a saving of expense and time. A drip valve at the lowest part of the hydrant drains the standpipe, thus preventing freezing and the expense of supplying a frost case. In order that the nozzles may be easily removed, as is sometimes necessary to change nozzles of one standard to another, they are screwed in and secured by pins. The hydrants are of the compression type, and in closing the inlet valve operates in the same direction as the pressure from the main, and when closed this pressure aids the action of the stem in keeping the valve tight. In case of accident of any kind to the upper part of the hydrant, resulting in the relaxing of the tension on the stem of the valve, the pressure from the main will retain the valve in its closed position without any special mechanism, thus preventing inconvenience or damage from loss of water, flooded streets, etc.



NEW KENNEDY HYDRANT.



Iron drinking fountain with suitable facilities for furnishing water to men, horses and smaller animals. Made by the H. F. Jenks Co., Pawtucket, R. I.

INDUSTRIAL NEWS

Cast Iron Pipe.—Chicago—The number of municipal lettings in immediate prospect is disappointingly small. Quotations. 4-inch, $27; 6 to 12-inch, $25; 16-inch and up, $24.50. Birmingham—Foundries of the district continue to report a large volume of shipments. Stocks on hand are not large. With the stronger pig iron market prices are firm and it is difficult to get any producer to shade prices. There is a big inquiry from the West and Central West, but no large orders are now pending. Quotations: 4 to 6-inch, $23; 8 to 12-inch, $22; over 12-inch, average, $21. New York—Buying by water and gas companies is quite active. A prominent company now has orders representing a greater aggregate tonnage than at the corresponding time for the past five years. Quotations: 6-inch, car loads, $22 to $23.

Lead.—No material changes have occurred in the lead market since a week ago. The American Smelting & Refining Company continues its price of 4c., New York, and 3.92½c., St. Louis, and is taking the bulk of what business is being done. Conditions generally are quiet. Independent producers have taken some business at 4c., St. Louis.

Dust Layer.—The Alden Speare's Sons Co., Boston, New York and Chicage, have issued a booklet describing their odorless, stainless, water-white dust layer, which they place on the market under the trade name of "Tasscoil." This preparation was brought out early in the season of 1911. The manufacturers state that the results have exceeded their greatest expectations and that now hundreds of suburbs use Tasscoil. It is as easy to apply Tasscoil as to apply water, and the expense is said to be less. One gallon will cover from six to nine square yards and the street can be left open to traffic during the application. Streets so treated have the appearance of a road after a light rain. The pamphlet contains illustrations of streets treated with Tasscoil and copies of letters from people who have used in.

Streator Shale Brick.—The Streator Paving Brick Co., Streator, Ill., are improving their plant by building an engine house. They are installing other improvements which will increase their capacity. The manufacturers state that they are shipping paving brick to constantly widening territory. They have shipped brick as far north as Winnipeg, south to Vicksburg and west to Nebraska.

Paving Company Dissolved.—The United Paving Co., Atlantic City, N. J., has ceased to exist. The office furniture has been sold to meet a rental claim. W. E. Shackleford, who succeeded W. I. Cherry, as president, says there are some judgments pending against the combine, and action will shortly be taken toward meeting them. As a corporation, however, the United Paving Co. has ceased to exist.

Calcium Chloride.—The Solvay Process Company, manufacturer of calcium chloride, operating a soda ash and coke making plant at Delray, a Detroit suburb, is planning the addition of 40 coke ovens to its equipment, raising the total to 170 and involving the expenditure of $500,000.

Road Building Company.—The interest in the building of good roads throughout the United States has caused J. H. Whyte, of San Antonio, Tex., to plan the organization of a $10,000,000 company, to be known as the United States Road Construction Corporation, whose purpose will be when fully organized and financed, to take contracts for building good roads in any part of the United States. It is believed by Mr. Whyte and his associates that there is room for a company of this kind, which will be prepared to contract for road building covering any class of work in any part of the country. It is proposed that the company shall have in its employ able engineers and practical road builders. It is intended that the company shall be so organized that it will construct, according to the needs of various communities, plain dirt roads or the highest quality of macadam, asphalt or vitrified brick roads, using in this work up-to-date machinery.

Tractor.—The United States Agricultural Tractor Co., Hartford, Conn., has been incorporated under a Connecticut charter to develop and manufacture a new traction engine. The incorporators are: Lewis C. Grant and Sidney A. Grant, Enfield, Conn., and Frank H. Whipple, C. H. Cooley, Geo. H. Burt and Judge Ralph M. Grant, Hartford. The company has a paid-in capital of $55,000. It will first perfect the machine as a commercial product and manufacturing will follow.

Industrial Research.—The Institute of Industrial Research, 19th and B streets N. W., Washington, D. C., have issued Bulletin No. 3, describing the scope and organization of the corporation. Besides general descriptive matter the bulletin contains photographs of the lecture room, a corner of the paint testing laboratory, a view of one of the chemical laboratories, the cement testing laboratory, a number of details of the bitumen laboratory, and a corner in the physical and electrical engineering laboratory.

Iron Pipe.—Plans for the reorganization of the Massillon Iron & Steel Company, Massillon, O., which have been under way for some time, have resulted in the organization of a new company under the name of the Massillon Pipe & Foundry Company. The new company has a nominal capitalization of $10,000, but it is understood that this will shortly be increased to $1,500,000.

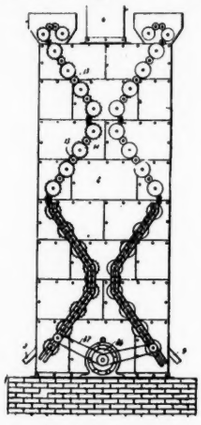
Wheelbarrows.—The Kilbourne & Jacobs Mfg. Company, manufacturers of wheelbarrows and other contractors' equipment, has plans under way for an extension to its plant. The new addition will be about 100 x 200 feet, one story, and of steel and concrete construction. Much of the equipment has not yet been bought.

Power House.—The Stone & Webster Engineering Corporation, constructing engineers, Boston, Mass., have published an attractive booklet telling the story of the reconstruction of the Minneapolis General Electric Co.'s power house, which was destroyed by fire. The company made a remarkable record in restoring service and building the new plant, and the story is told in an interesting way, with handsome illustrations.

PATENT CLAIMS

1,018,951. SAND-DRYING FURNACE. Frederick W. Adlof, New Kensington, Pa. Serial No. 602,148.

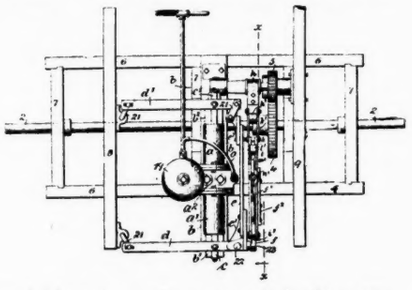
In a sand-drying furnace, a casing having an aperture therein, a collar mounted in said aperture and having a series of longitudinally-extending slots therein, a cylinder shaft journaled in said collar and extending within said casing,



a cylinder concentric with and surrounding said shaft, and radially disposed members supporting said cylinder in position, said members having their inner ends in sliding engagement with said slot, whereby expansion may take place between the several parts.

1,018,804. LIQUID-SPRAYER. Lewis Augustus Aspinwall, Jackson, Mich., assignor to Aspinwall Manufacturing Co., Jackson, Mich., a Corporation of Michigan. Serial No. 501,097.

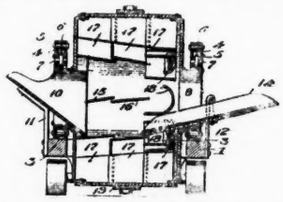
In a liquid spraying device, the combination with devices for supplying the power, of an air chamber and pump cylinders and pistons, series of devices connecting the pump pistons capable of



variable extent of movement, devices connecting the said series of devices with the power, and manually actuated means adapted for a predetermined adjustable relation to the series of devices connecting the pump pistons so as to control the pressure in the air chamber employed to force the liquid through the sprayers.

1,018,779. CONCRETE-MIXER. Theodore Rauschenbach, Evansville, Ind. Serial No. 549,136.

In a mixing device, a rotatable drum having secured to its interior peripheral wall near its inlet two overlapping sets of staggered mixing blades, said blades extending in parallel planes, a third set of



parallel blades at its discharge end and extending in planes at an agle to those of the two mentioned sets, and a set of laterally curved blades alternating with those of the third set and adapted to return the material being mixed to the inner one of the two sets.

THE WEEK'S CONTRACT NEWS

Relating to Municipal and Public Work—Street Improvements—Paving, Road Making, Cleaning and Sprinkling—Sewerage, Water Supply and Public Lighting—Fire Equipment and Supplies—Bridges and Concrete Work—Sanitation Garbage and Waste Disposal—Police, Parks and Miscellaneous—Proposals and Awards.

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also corrections of any errors discovered.

BIDS ASKED FOR

STATE		RECEIVED UNTIL	NATURE OF WORK.	ADDRESS INQUIRIES TO
			STREET IMPROVEMENTS	
Wisconsin....	Neenah.....	Mar. 23.....	Pavg. Wis. avenue.....	J. P. Keating, Sec'y Bd. Pub. Wks.
Iowa.....	Sioux City.....	Mar. 23.....	Constrn. 30,000 yds. cement pavement.....	City Clerk.
Kansas.....	Emporia.....	Mar. 23.....	Constrn. 2¼ miles pavement; cost, $75,000.....	Matthew Brown, City Engr.
Ohio.....	North Lima.....	Mar. 23, 2 p.m.....	Pavg. 2 miles of road.....	Bd. Trus.; Haseltine & Montgomery, Engrs. Youngstown.
Virginia.....	Lynchburg.....	Mar. 23.....	Constrn. 56,000 sq. yds. paving, 23,000 curb, 18,000 sq. yds. trench excavation.....	H. L. Shaner, City Engr.
Pennsylvania..	Harrisburg.....	Mar. 23, noon.....	Grading 5 streets.....	Elmer E. Pritchey, Comr.
Ohio.....	Youngstown.....	March 23, 2 p.m.....	Paving road	Township Trustees.
Ohio.....	Canton.....	Mar. 25, 10 a.m....	Constrn. 1.48 miles road.....	County Comm.
Pennsylvania..	Oil City.....	Mar. 25.....	Pavg. with vitrified brick or bituminous concrete 21,000 sq. yds, also 14,000 ft. curbing.....	R. MacKenzie, City Compt.
Ohio.....	Euclid.....	Mar. 25, noon.....	Improving Euclid road.....	F. H. Shoaff, Village Clk.
Ohio.....	Toledo.....	Mar. 25, 10 a.m....	Repairing stone road.....	C. S. Sanzenbacher, County Aud.
Arkansas.....	Little Rock.....	Mar. 25, noon.....	Pavg. with wood block, asphalt or brick 16,850 yds.....	A. Brizzolara, Chm. Dist. No. 192.
New York.....	New York.....	Mar. 25, 2 p.m.....	Pavg. with sheet asphalt 30 streets.....	George McAneny, Boro. Pres.
Connecticut...	Hartford.....	Mar. 25, 11 a.m....	Constrn. sheet asphalt pavement on 5 streets.....	Jos. Buths, Sec'y Bd. Contract.
Kansas.....	Emporia.....	Mar. 25.....	Pavg. 2 streets.....	F. H. Smith, City Clk.
Illinois.....	Forest Park.....	March 25, 7 p.m.....	Improving a number of streets.....	J. T. Carney, Sec. Bd Local Imp.
Iowa.....	Burlington.....	March 25, 4 p.m.....	Paving alley with concrete.....	H. G. Vollmer, City Engineer.
Iowa.....	Creston.....	March 25, 8 p.m.....	Improving a number of streets.....	J. F. Golden, City Clerk.
New Jersey...	Haddon Heights.	March 26, 8 p.m.....	Laying 250 M. brick blocks in gutters.....	Fred. Fries, Mayor.
New Jersey...	South Orange....	March 26.....	Grading and macadamizing street.....	W. H. Kemp, Chair. Town Com.
N. Y., S. I.....	New Brighton...	Mar. 26.....	Furn. 12,000 tons crushed stone.....	Geo. Cromwell, Boro. Pres.
Ohio.....	Canton.....	Mar. 26.....	Pavg. Marlboro road.....	County Comm.
Illinois.....	Verden.....	Mar. 26, 2 p.m.....	Constrn. 15,000 yds. brick pav't, asphalt filler.....	City Clerk.
Wisconsin....	Janesville.....	Mar. 26, 2 p.m.....	Pavg. with brick 5,513 sq. yds.....	J. C. Nichols, Chm. Comm.
Pennsylvania..	Lisbon.....	Mar. 26.....	Constrn. concrete culverts.....	County Comm.
Alabama.....	Camden.....	Mar. 26.....	Constrn. 4 miles gravel road.....	Board County Comm.
Oklahoma.....	Muskogee.....	Mar. 26, 10 a.m....	Pavg. with bituminous concrete.....	Chas. Wheeler, City Clk.
Indiana.....	Jeffersonville...	Mar. 27, 10 a.m....	Improving roads in cemetery.....	G. S. Bingham, A. Q. M.
New York....	Brooklyn.....	Mar. 27, 11 a.m....	Constrn. sidewalks, paving roadways with asphalt, concrete foundation (11 contracts), and furn. 400,000 gal. asphalt road oil and 100,000 gal. tar road oil.....	A. E. Steers, Boro. Pres.
Wisconsin....	DePere.....	Mar. 27.....	Pavg. with sheet asphalt or asphalt macad.....	City Clerk.
Minnesota....	Ivanhoe.....	Mar. 28.....	Imp. 2 roads.....	K. A. Hansen, County Aud.
New York....	Brooklyn.....	Mar. 28, 3 p.m.....	Repairing asph. pav't on conc. foundation of several roads..	Chas. B. Stover, Pres. Park Bd.
Ohio.....	Columbus.....	Mar. 29.....	Imp. and macadamizing a number of roads.....	County Comm.
Alabama.....	Roanoke.....	Mar. 29.....	Constrn. road sand, clay or top soil.....	W. S. Keller, State Highway Engr.
Florida.....	Jacksonville.....	Mar. 29.....	Constrn. road.....	Board of County Commissioners.
Ohio.....	Cincinnati.....	Mar. 29, noon.....	Improving road.....	Board of County Commissioners.
Ohio.....	Ottawa.....	Mar. 29, noon.....	Constrn. stone roads.....	J. E. Roese, County Aud.
Ohio.....	Galion.....	Mar. 30, noon.....	Pavg. portions of 2 streets.....	E. C. Yochem, Clk. Dir. Pub. Serv
Ohio.....	Coitsville Center.	Mar. 30, 10 a.m....	Grading road.....	J. D. Lowry, Township Clk.
Wisconsin....	Milwaukee.....	March 30.....	Constrn. 50,000 square yards paving.....	H. E. Briggs, Com. Pub. Works.
Indiana.....	Vernon.....	Apr. 1.....	Constrn. 2 blocks paving.....	J. L. Schultheis, City Clk.
Ohio.....	Alliance.....	Apr. 1 (about).....	Constrn. brick pavement and grading.....	J. F. Hogan, Clk. Dir. Pub. Serv.
Indiana.....	South Bend.....	Apr. 1, 11 a.m.....	Constrn. macadamized road, 3 miles.....	Clarence Sedgewick, County Aud.
California.....	Vallejo.....	Apr. 1.....	Constrn. 6,000 sq. ft. concrete and asph.; cost, $150,000.....	A. P. Noyes, City Engr.
Louisiana.....	Shreveport.....	April 1.....	Furn. 60,000 tons hard rock or gravel.....	J. T. Bullen, Parish Engineer.
Indiana.....	South Bend.....	Apr. 1.....	Impg. Edwardsburg road.....	R. E. Keller, County Surveyor.
Ohio.....	Oberlin.....	Apr. 1.....	Constrn. 6,000 yds. brick pavement; cost, $12,000.....	H. T. Marsh, City Clk.
Ohio.....	Sandusky.....	Apr. 1.....	Constrn. 6½ miles roadway.....	Cedar Point Resort Co.
Alabama.....	Bethany.....	Apr. 1 (about).....	Constrn. pavement; cost, $25,000.....	F. T. McCay, City Recorder.
Alabama.....	Montgomery....	Apr. 1 (about).....	Constrn. 4½ miles gravel road.....	County Commissioner.
New Jersey...	Westfield.....	Apr. 1, 8 p.m.....	Constrn. bluestone cross walks.....	Chas. Clark, Town Clk.
Indiana.....	English.....	Apr. 1.....	Constrn. macadamized roads.....	J. E. Jones, County Aud.
Indiana.....	Vernon.....	Apr. 1.....	Constrn. pike road.....	M. W. Brogan, County Aud.
Minnesota....	Minneapolis.....	Apr. 1.....	Constrn. gravel roads.....	A. P. Erickson, County Aud.
Indiana.....	Vincennes.....	Apr. 2, 2 p.m.....	Constrn. 3,900 ft. gravel road.....	J. T. Scott, County Aud.
Indiana.....	Wabash.....	Apr. 2.....	Pavg. bridge with creosoted blocks.....	D. E. Showalter, County Aud.
Indiana.....	Kokomo.....	Apr. 2.....	Constrn. 21 miles gravel roads.....	A. B. Easterling, County Aud.
Michigan.....	Bessemer.....	Apr. 2.....	Imp. 37 miles road.....	G. Barber, Chm. County Comm.
New Jersey...	Paterson.....	Apr. 2.....	Pavg. number of sts. with permanent & semi-permnt. pavg..	H. J. Harder, City Engr.
New York....	Niagara Falls....	Apr. 2, 7.30 p.m....	Pavg. 2 streets.....	F. S. Parkhurst, Jr., City Engr.
Indiana.....	Marion.....	Apr. 2.....	Constrn. 3 gravel and 2 macad. roads.....	E. H. Kimbell, County Aud.
Indiana.....	Bloomington.....	Apr. 2.....	Constrn. 2 stone roads.....	Horace Blakely, County Aud.
Indiana.....	Lawrenceburg...	Apr. 2.....	Constrn. highways.....	W. S. Fagaly, County Aud.
Indiana.....	Wabash.....	Apr. 2.....	Constrn. gravel roads.....	Dan Showalter, County Aud.
Illinois.....	Decatur.....	Apr. 2.....	Constrn. macadamized road.....	H. S. Michaud, County Aud.
Virginia.....	Portsmouth.....	Apr. 2, noon.....	Pavg. with granite (blocks furnished).....	E. D. Hawks, Chm. St. Comm.
Indiana.....	Union.....	Apr. 2, 10 a.m.....	Improving road.....	B. B. Engle, County Aud.
Alabama.....	Montgomery....	Apr. 2, noon.....	Pavg. 2 streets.....	Robt. Tait, City Treas.
West Virginia.	Huntington.....	Apr. 3, noon.....	Constrn. 4 miles or road, brick, stone or macadam.....	F. F. McCullough, Clk.
New Jersey...	Long Branch....	Apr. 3.....	Constrn. section of Ocean Highway; cost, $20,000.....	Freeholders.
West Virginia.	Bluefield.....	Apr. 5.....	Constrn. 38,000 yds. bituminous macadam.....	Board of Affairs.
Hawaii.....	Pearl Harbor....	Apr. 6, 11 a.m.....	Constrn. 22,575 sq. yds. oil macadam.....	Commandant Naval Sta., Wash'gton.
Iowa.....	Marshalltown....	April 7.....	Constrn. 33 blocks of concrete paving.....	W. H. Steiner, City Engineer.
California....	South Pasadena..	April 8, 5 p.m.....	Improving roads, cost $85,000.....	D. F. Dupuy, City Engineer.
Alabama.....	Talladega.....	Apr. 8.....	Constrn. 4½ miles gravel road.....	W. S. Keller, State Highway Engr.
California.....	San Bernardino..	Apr. 8, 11 a.m.....	Constrn. highways and bridge.....	J. Bright, Jr., County Surv.
Minnesota....	Winona.....	Apr. 9.....	Constrn. 21 miles macadam road.....	Jos. Winczewski, County Aud.

BIDS ASKED FOR

State	City	Received Until	Nature of Work	Address Inquiries to
Ohio	Warren	Apr. 9 (about)	Constrn. 3 miles of brick, asph. block and wood block pav't on slag and concrete foundation in several streets	Wm. E. Dilley, City Clk.; B. C. Smith, City Engr.
Ohio	East Youngst'n	Apr. 10, noon	Constrn. sidewalks	P. J. Carney, Clk.
Montana	Missoula	April 10	Constrn. 24,000 yards vitrified brick pavement	F. E. Buck, City Engineer.
Illinois	Danville	Apr. 11	Constrn. county line road	L. W. Borders, County Aud.
Pennsylvania.	Freeport	Apr. 15, 7.30 p.m.	Constrn. 2,800 sq. yds. vit. pav't, gradg. & curbg. 2 streets	G. B. Findley, Boro. Engr.
Florida	Lakeland	Apr. 15	Laying pavement	Board of Bond and Trustees.
Ohio	Cleveland	Apr. 17, 11 a.m.	Imp. North Woodland road No. 2 & Center Ridge rd. No. 2.	John F. Goldenbogen, County Clk.
Ohio	Akron	Apr. 25 (about)	Constrn. brick road	G. L. Farnsworth, City Engr.
Illinois	Ottawa	Apr. 30	Pavg. with brick on concrete; cost, $300,000	J. C. Moore, County Aud.
Illinois	Rochelle	Apr. 30 (about)	Pavg. with brick on concrete base; cost, $85,000	W. B. M. Henry, Mayor; Aetna Eng. Bureau, Chicago.
Ohio	Canton	June 1	Pavg. Broadway with brick block	R. F. Harbent, Dir. Pub. Serv.

SEWERAGE

New York	Hobart	Mar. 25	Constrn. sewers and disposal plant	W. J. H. Robinson, Village Clk.
Kansas	Mulvane	Mar. 25	Constrn. sewer system	R. P. Seyfer, City Clk.
Nebraska	Omaha	Mar. 25	Constrn. storm sewers; cost, $54,000	G. W. Craig, City Engr.
Ohio	Andover	Mar. 25	Constrn. sewerage disposal plant	F. A. Woodward, Vil. Clk.; B. F. Hewitt, Engr., Jefferson, O.
Connecticut	Hartford	Mar. 25, 11 a.m.	Constrn. sewers	Jos Buths, Sec'y Bd. Contract.
Canada	Toronto, Ont.	Mar. 26, noon	Constrn. 5,700 ft. 42-in. reinfrcd. concrete pressure pipe	G. R. Geary, Mayor.
South Dakota	Sioux Falls	Mar. 26, 11 a.m.	Constrn. west side sewer	City Commissioners.
New York	St. George, S. I.	Mar. 26, noon	Constrn. outfall sewer	Boro. Pres.
Ohio	Cleveland	Mar. 26, noon	Constrn. sewers on 10 streets	W. J. Springborn, Dir. Pub. Serv.
New Jersey	South Orange	March 26	Constrn. storm sewer	W. H. Kemp, Chair. Town Com.
Michigan	Grand Rapids	Mar. 28, 8 p.m.	Constrn. sewage pumping station, transporting and erecting pump, piping, motors, transformers and crane	E. H Christ, Pres. Bd. Pub. Wks.
Indiana	Decatur	Mar. 28	Constrn. sewer	H. M. Devoss, City Clk.
California	Anaheim	Mar. 28	Constrn. section of outfall sewer	City Clerk.
Idaho	Pocatello	Mar. 28, 7 p.m.	Constrn. 4,000 ft. 10-in., 20,000 ft. 8-in., 1,000 ft. 6-in. and appurtenances, 5 contracts	J. P. Congdon, City Engr.
Canada	Saskatoon, Sask.	Mar. 29, noon	Laying 13 miles sewer and water mains	G. T. Clark, City Engr.
Hawaii	Pearl Harbor	Mar. 30, 11 a.m.	Constrn. sewer system Pearl Harbor	Navy Dept., Washington, D. C.
Texas	Clarksville	April 1 (about)	Constrn. 8 miles sewers, cost $25,000	J. K. Webb, City Clerk.
West Virginia	Huntington	Apr. 1	Constrn. sewers	B. Maupin, City Engr.
Pennsylvania	Forest City	April 1, 6 p.m.	Constrn. 5,600 feet 12 to 20-inch clay pipe sewer	B. McClucky, Borough Secretary.
Missouri	Shelbina	Apr. 2	Constrn. 3 miles sewer laterals	City Clerk; Burns & McDonnell, Engrs., Kansas City, Mo.
Oregon	Carlton	Apr. 2	Constrn. water system	U. Kutch, City Recorder.
Missouri	California	Apr. 4	Constrn. 3 miles laterals outlet sewer & 3 septic tanks	City Clerk; Burns & McDonnell, Engrs., Kansas City, Mo.
West Virginia	Bluefield	Apr. 12	Constrn. 3,000 ft. 54-in. conc. & 3,400 ft. 15-in. clay pipe sewer	W. H. Campbell, City Engr.
Florida	Lakeland	Apr. 15	Constrn. sewers	Board of Bond and Trustees.
Louisiana	New Orleans	Apr. 25, noon	Constrn. concrete line and covered sewer, 7,310 lin. ft. terra cotta pipe line, 26 to 6-in. diameter	F. S. Shields, Scy. Sew. & Water Bd.
California	Covina	May 1	Constrn. sewer system; cost, $45,000	Town Clerk and F. G. Dessery, Eng., Los Angeles, Cal.
Illinois	Altamont	May 1	Constrn. sewer system	City Council.
California	Venice	May 1	Constrn. sewers; cost, $15,000	G. F. Lewin, City Engr.

WATER SUPPLY

Pennsylvania.	Erie	March 22, 1.30 p.m.	Furn. iron castings, brass goods and curb boxes	G. C. Gensheimer, Secretary, Com-
Pennsylvania.	Eatna	March 25, 5 p.m.	Furn. 3,000,000 gallon pump and appurtenances	J. C. Armstrong, Borough Clerk.
Massachusetts.	Boston	March 25, noon	Relaying 1,850 feet 16-in. water pipe; also 1,200 ft. 36-in.	L. K. Rourke, Com. Pub. Works.
Pennsylvania.	Aspinwall	Mar. 25, 7.30 p.m.	Constrn. reinforced concrete reservoir	S. R. Chase, Boro. Clk.
Wyoming	Sheridan	Mar. 25, 10 a.m.	Constrn. 7,450 ft. 4-in. c. i. pipe	J. J. Withrow, City Clk.
Ohio	Euclid	Mar. 25, noon	Constrn. water main	F. H. Shoaff, Clk.; Pearse Eng'g Co.
New York	New York	Mar. 26, 11 a.m.	Furn. & delivering bronze ladders, steel gratings, c. i. pipe rails and steel plates for Ashokan reservoir	Board of Water Supply.
Massachusetts.	Boston	March 27, noon	Furn. hydrant, gate and blow-off boxes	E. J. Mullen, Supt. of Supplies.
New York	Peekskill	Mar. 28, 3 p.m.	Constrn. reservoir at Wicopee	Water Board.
Canada	Saskatoon, Sask.	Mar. 29, noon	Constrn. water mains, etc	City Comm.
Wisconsin	Watertown	Apr. 1	Constrn. well and installing pump	W. T. Vose, Sec'y Water Comm.
Canada	Winnipeg, Man.	Apr. 1	Installg. 2 deep well motor-driven turb. pumps, 1,000,000 gal. capacity	M. Peterson, Sec'y Bd. Control.
Pennsylvania.	Pittsburg	Apr. 1 (about)	Constrn. reservoir & gate house; cost, $1,000,000	Director Public Works.
New York	New York	Apr. 2, 11 a.m.	Constrn. Walkill blow-off	Board of Water Supply.
Massachusetts.	Boston	April 2, noon	Laying water pipes in various streets	L. K. Rourke, Com. Pub. Works.
Dist. Columbia.	Washington	Apr. 3, noon	Bldg. dam and remodeling Georgetown reservoir	W. C. Langfett, Lieut. Col. Engrs.
Florida	Pensacola	April 16, noon	Constrn. reinforced concrete reservoir	D. Kugelman, Chair. Committee.
Illinois	Fairbury	Apr. 17	Constrn. steel water tank	T. D. Karnes, City Clk.
Illinois	Altamont	May 1	Constrn. water works and furn. hydrants, valves, c. i. pipe, pumps, tower and tank	City Council.
Florida	Titusville	May 20	Constrn. water works	Geo. M. Robbins, Chm. Bond & Trus.
Colorado	Aguilar	June 1 (about)	Constrn. water works; cost, $70,000	City Clerk.

LIGHTING AND POWER

Ohio	Cleveland	March 21, noon	Furn. electrical meters	W. J. Springborn, Dir. Bd. Pub. Serv
New Jersey	Camden	March 22, 8 p.m.	Furn. complete testing outfit	A. L. Jones, Chairman, Comm.
Canada	Winnipeg, Man.	Mar. 25	Furn. cables for fire and electric system	M. Peterson, Sec'y Bd. of Control.
New York	Yonkers	Mar. 25, 3 p.m.	Furn. 10,000,000 gal. pumping engine	J. V. Mahony, Sec'y Bd. Contract.
California	Sacramento	Mar. 25	Installing underground elec. conduit system	M. J. Desmont, City Clk.
Tennessee	Memphis	Mar. 26, noon	Furn. turbines, pumping sets, boilers and electric light plant.	Miss. Riv. Comm., U. S. Engr. Office.
Massachusetts.	Holyoke	Mar. 26, 10 a.m.	Constrn. retort house for gas works, coal shed, conveyors, condensers, scrubbers	W. H Snow, Mgr. Gas & Elec. Dept.
Canada	Toronto, Ont.	Mar. 26	Furn. elec. equipment for pumping station	G. R. Geary, Mayor.
Michigan	Grand Rapids	March 28, 8 p.m.	Transporting and erecting motors, etc	E. H Christ, Pres, Bd. Pub. Works.
Illinois	Canton	Mar. 30, 2 p.m.	Furn. and erecting pumping engine	C. W. Snyder, Chm. Water Comm.
Canada	Moose Jaw, Sask.	Mar. 30, 10 a.m.	Furn. 1,500 kw. turbo gen. & 500 kw. direct-connected gen	A. W. Maybery, Chm. City Comm.
Canada	Edmonton, Alta.	Mar. 31	Improving lighting plant; cost, $200,000	J. C. Huffman, Supt. of Plant.
Ohio	Navarre	Apr. 1	Furn. elec. driven triplex pump, 250 gal. per min., tank, 5 miles 4 to 10-in. c. i. pipe, hydrant, etc	H. W. Foster, Mayor; L. E. Chapin, Consult. Engr., Pittsburgh.
Mississippi	Clarksdale	Apr. 2	Furn. 250-h.p. boiler and feed pump	W. S. Bobo, City Engr.
Georgia	Atlanta	Apr. 3	Furn. elec. st. lighting serv. for city; 1,600 luminous arc lights, 80 c.p. series tungsten 1,000; 400 (White Way) posts, 400 c.p.	J. E. McClellan, Chm. Elec. Light Service Comm.
South Dakota.	Madison	Apr. 4	Furn. oil engine, 2 motors and pump	Wm. Rae, City Aud.; Mo. Val. Eng. Co., Mitchell, S. D.
Illinois	Alton	Apr. 6	Lighting streets with 260 arcs	B. R. Kennedy, City Clk.
Illinois	Alton	April 6, 2 p.m.	Lighting streets with 260 arcs	B. R. Kennedy, City Clerk.
Kansas	Topeka	May 7, 2 p.m.	Furn. 50-h.p. engine and generator	H. C. Bowman, Chm. State Bd. Con.

BIDS ASKED FOR

STATE	CITY	RECEIVED UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
			FIRE EQUIPMENT	
Ohio	Lakewood	March 21, noon	Furn. combination chemical pumping auto engine	J. H. Brown, Director Public Safety.
New Jersey	Paterson	Mar. 24, 4 p.m.	Constrn. engine house	City Clerk.
Canada	Moose Jaw, Sask.	March 25, noon	Furn. 500 feet 2½-in fire hose	A. W. Mayberry, Comm.
Pennsylvania	Glenlyon	March 29, 10 a.m.	Furn. 1,800 feet fire hose	Wm. O. Davis, Sec. Board. Commis.
New Jersey	Paterson	March 29, noon	Building engine house	T. F. Morgan, Pres. Fire Comm.
Minnesota	Duluth	Mar. 29, 2 p.m.	Bldg. fire hall	John Connelly, Sec'y Comm.
Canada	Niagara Falls	Apr. 1	Furn hook and ladder truck	W. J. Seymour, City Clk.
			BRIDGES	
Ohio	Steubensville	Mar. 26	Constrn. concrete bridge; cost, $1,000	E. C. Ginger, County Surv.
California	Pasadena	Mar. 26	Constrn. concrete bridge, 1,460 ft. long	Herman Dyer, City Clk.; Waddell & Harrington, Kansas City, Mo.
Nebraska	Grand Island	Mar. 26, 2 p.m.	Repairing bridges	G. E. Neumann, Clk. Supervs.
Indiana	Ft. Wayne	Mar. 28	Constrn. three 92-ft. span reinforced concrete arch bridge	County Auditor.
Florida	Jacksonville	Mar. 29	**Constrn. 1 concrete and 2 wooden bridges**	**C. W. Ellis, Chm. County Comm.**
Iowa	Sioux City	Mar. 30, 10 a.m.	**Constrn. bridge**; cost, $6,000	**K. C. Gaynor, City Engr.**
Icwa	Marshalltown	Apr. 1	Constrn. 5 concrete bridges	County Auditor.
Indiana	Bluffton	Apr. 1 (about)	Constrn. 8 concrete bridges and box culvert	**L. A. Williamson, County Aud.**
South Dakota	Yankton	Apr. 1, 7.30 p.m.	Constrn. reinforced concrete bridge	J. W. Summers, City Aud.
Indiana	Kokomo	Apr. 2, 10 a.m.	Constrn. reinforced concrete bridge	A. B. Easterling, County Aud.
South Dakota	De Smet	Apr. 2, 1 p.m.	Constrn. bridges and culverts	W. M. Look, County Aud.
North Dakota	Hillsboro	Apr. 3, 3 p.m.	Erectg. steel, wooden & concrete bridges for year 1912	Nels. O. Lindaas, Aud.
South Dakota	Howard	Apr. 3, 2 p.m.	Constrn bridges during year	H. L. Arnold, County Aud.
Ohio	Hamilton	April 3, 10 a.m.	Constrn. bridge over canal	W. W. Crawford, County Auditor.
South Dakota	Mitchell	Apr. 8, 2 p.m.	Constrn bridges during year	R. A. Zangle, County Aud.
Minnesota	Winona	Apr. 9	**Constrn. 80-ft. steel truss bridge**	**County Auditor.**
Illinois	Maywood	Apr. 15 (about)	Constrn. concrete bridge; cost, $35,000	Westcott & Ronneberg, Engs., Chicago.
			MISCELLANEOUS	
Massachusetts	Boston	March 22, 3 p.m.	Covering flying cage with wire fabric	R. S. Peabody, Chair. Park Comm.
Ohio	Lexington	Mar. 23	Bldg. town hall	Jacob Hellinger, City Clk.
Canada	Merid, Sask.	Mar. 24	Furn. road grader, 6 wheel scrapers, 12 slush scrapers	L. W. Atkinson.
Pennsylvania	Pittsburgh	Mar. 25	Excavatg. and lowering grade of Grant street	J. E. Armstrong, Dir. Pub. Wks.
Dist. Columbia	Washington	Mar. 25	Furn. 300,000 fire brick and 60 tons fire clay	C. H. Rudolph, Chm. Comm.
Connecticut	Hartford	Mar. 25, 11 a.m.	Sprinkling streets	Jos. Buths, Sec'y Bd. Con.
Connecticut	Waterbury	Mar. 25, 5 p.m.	Collecting and removing garbage	City Clerk.
New York	New York	Mar. 26, noon	Disp. of ashes, sweepings & rubbish delivered on scows	Wm. H. Edwards, Comm. St. Clean.
Indiana	Indianapolis	Mar. 26	Furn. road grader	Chas. McGuire, Chm. County Comm.
New York	New York	March 26, 11 a.m.	Furn. bronze ladders, steel gratings, railings, etc., for gate house	Chas. Strauss, Pres. Bd. Water Sup.
Canada	Halifax, N. S.	Mar. 27	Constrn. garbage incinerator	J. J. Hopewell, Clk. Cy. Wks. Office.
New York	New York	March 28, 3 p.m.	Furn. 2,500 cubic yards top soil	C. B. Stover, Pres. Park Comm.
Kentucky	Manchester	Apr. 1	Constrn. jail	T. J. Rawlings, Chrmn.
North Dakota	Rugby	Apr. 3	Furn. metal culverts, graders, slushers, scrapers & rd. drags.	Henry Albertson, County Aud.
Ohio	Painsville	April 4, noon	Constrn. pavilion and bath house	R. S. Belknap, Sec., Park Comm.
Ohio	Youngstown	Apr. 10, noon	Constrn. 15 voting booths	J. V. Murphy, Clk. State Supervs.
Iowa	Council Bluffs	Apr. 11, noon	Bldg. township hall for Garner Township	Fred Childs, Chm. Trustees.
Cuba	Santiago	May 6	Constrn. 6,400 meters of tramway	La Jefatura del Distrito de Oriente.

STREET IMPROVEMENTS

Los Angeles, Cal.—Establishment of boulevard system connecting all city parks is recommended.

Los Angeles, Cal.—City Engineer has reported plans for improvement of various streets.

Oak Park, Cal.—Paving of business center with asphalt has been planned.

Pomona, Cal.—Resolutions are being considered for laying of seven miles of paving, construction of first-class roadways leading into heart of business section of city from east, west, north and south, and forming link in ocean to ocean highway and one in all probability in State highway.

Sacramento, Cal.—Streets of entire business section of Oak Park will be paved with asphalt.

Sacramento, Cal.—Macadamizing of Greenback lane, which will be connecting link in series of fine boulevards in Sacramento County, and which will complete 42-mile loop from Sacramento to Folsom, will be started shortly.

Santa Monica, Cal.—Proceeding have been begun for paving and grading of various streets.

Santa Monica, Cal.—Ordinance for paving and parking of Oregon ave., from Sawtelle to sea, prepared by City Attorney Taft, will be adopted by City Council.

Waterbury, Conn.—Macadamizing of two-mile strip of lower Waterville rd., or Thomaston ave., is being considered.

Washington, D. C.—Latin-American Government recently passed law authorizing repavement of streets and construction of new system of sewers in certain city. Engineers have already been employed to make necessary surveys and draw up plans and specifications for work. Bids for carrying out undertakings will be called for as soon as plans are completed, and American consular officer reports that it is desired that American contractors submit tenders for this work. Pavement will probably be of asphalt, but composition that will not soften will be required. Further particulars can be obtained from Bureau of Manufactures, No. 8361.

Lakeland, Fla.—Board of Bond Trustees are busy getting ready for improvements to streets and sewers at cost of $150,000.

Tampa, Fla.—Board of Public Works has voted endorsement of petition to extend North blvd. paving to West Tampa, and will refer it to Council for action. It also decided to advertise for bids for putting down street paving authorized by Council, which includes Willow st. paving, Seventh ave. extension, Florida ave., from Eighth to Michigan aves., and streets in vicinity of union station.

Cedartown, Ga.—City will vote on April 8 on $20,000 bond issue for street paving.

Alton, Ill.—Petition will be filed asking County Court to order proposition submitted in Wood River Township at election April 9 to levy special tax to pay for building 15 miles of hard roads in township.

Evansville, Ind.—Board of Public Works has confirmed resolutions for improvement of Lincoln ave., from Line st. to I. C. Railroad, and Clerk has been instructed to advertise for bids on improvements. Board also confirmed preliminary resolution for improvement of Iowa st., from Edgar to Garvin. Action on petition for new sidewalks was deferred until March 23.

Fort Wayne, Ind.—Plans have been approved for opening and widening of Barthold st. to accommodate planned bridge over St. Mary's River and for opening of Calhoun and Cass sts., from Sixth to Putnam, and for opening of Putnam, from Calhoun st. to Wells st.

Indianapolis, Ind.—Resolutions have been confirmed for improvement of Hosbrook, Dearborn and Ritter sts.

South Bend, Ind.—Resolutions have been passed for improvements to various streets.

Spring Grove, Ind.—Residents of Spring Grove are preparting petition for improvement of pike running through little suburb, and ultimately hope that improvement will be executed under three-mile free gravel road act.

Topeka, Kan.—Repairing of Davies bridge is being considered.

Louisville, Ky.—Board of Public Works has authorized construction of various streets. Roger G. McGrath, Secretary.

Guilford, Me.—Appropriation of $2,000 has been made for highways, and $600 for sidewalks.

Portland, Me.—Board has voted in favor of plan of Lyman H. Nelson, recommending bond issuee for $2,000,000 for construction of Maine roads.

St. Joseph, Mo.—Ordinance has been passed providing for extension of 28th st. or Noyes blvd., from Messanie st. in southeasterly direction to Bartlett Park.

Baltimore, Md.—Bids, which were to have been received by City Register on March 27 for Paving Contracts 14 to 18, have been postponed until further notice. R. Keith Compton, Chairman.

Boston, Mass.—Project of widening and extending Avery st. to Tremont st. has been approved.

Boston, Mass.—Park Commissioners have submitted plans to City Council showing outline of proposed street across Back Bay Fens, between Art Museum and Jersey st.; estimated cost, including straightening of Feneway rd., is $98,010.

Boston, Mass.—Mayor Fitzgerald's plan for extension of Arlington st., from Boyston st. to Columbus ave., has been adopted, and loan of $463,000 has been authorized.

Malden, Mass.—Connecting boulevard, between north and south sides of Boston and another along Nepouset River are recommended.

Marion, Mass.—Appropriation of $2,800 has been made for laying sidewalks and $1,000 for macadamizing Point rd.

North Andover, Mass.—Macadamizing and grading of Beverly st. are being considered.

Taunton, Mass.—Petition from residents of Oak st. for macadam road on that thoroughfare, from Agricultural ave. to Wales st., has been received and referred to Committee on Streets and Bridges.

Hancock, Mich.—County Highway Commission has rejected bids on road work proposed by county in 1912. Bids will probably be re-advertised.

Portage, Mich.—It has been decided to allow people to vote on question of bonding township for $25,000 for building dirt wagon road from Houghton to Otter Lake, distance of 15 miles.

Seleewaing, Mich.—Township has voted in favor of $75,000 bond issue for good roads.

Two Harbors, Minn.—County Commissioners are planning extensive road improvements.

Missoula, Mont.—City is advertising

for bids on about 24,000 sq. yds. of vitrified brick pavement. Fred E. Buck, City Engineer.

Fargo, N. Dak.—Steps have been taken for opening of First, Second and Third aves. on south side. Mr. Anders is City Engineer.

Montclair, N. J.—Resolutions have been passed for paving of Orange rd. and South Mountain ave.

Passaic, N. J.—Appropriation of $2,800 has been made for purchase of steam road roller and grader for use in Department of Streets. Thos. R. Watson, City Clerk.

Rahway, N. J.—Extensive street paving has been planned; estimated cost, $97,-717 to $119,592.

Addison, N. Y.—Proposition of voting $4,000 for paving Main st. is being considered.

Albany, N. Y.—Bill has been introduced providing for bond issue of $50,000,000 for highway purposes, and proposition to be submitted at fall election to people if measure passes Legislature. Of this sum, $20,000,000 will be for improvement of State highway, and $30,000,000 for county road improvements.

Albany, N. Y.—Senator John F. Murtaugh has introduced bill providing for referendum of question of State issuing $50,000,000 in bonds for construction and improvement of State and county highways.

Babylon, L. I., N. Y.—Taxpayers vote upon another good roads proposition This proposition calls for appropriation of $20,-000 for purpose of paving and improving Main st. in connection with proposed construction of State road.

Fort Plain, N. Y.—Taxpayers will vote on whether $2,700 shall be appropriated for paving Killogg and Douglas sts. with macadam.

Highland, N. Y.—Main road from river to Highland Village will be graded and paved with brick; estimated cost, $100,-000.

Johnstown, N. Y.—Bids for paving bonds amounting to $21,000 recently offered for sale by city have been opened. Highest bid received was that of Curtis & Sanger, of New York, for 101.493.

Lockport, N. Y. — Aldermen have adopted report of Street Committee approving of several petitions for paving of Locust st., from Walnut st. to Lincoln ave., with genuine Trinidad pitch lake asphalt.

Lockport, N. Y.—Aldermanic Committee has voted in favor of asphalt paving of Locust st.

Lockport, N. Y.—Resolution has been adopted calling for improvement of Market st., from Union st. to Lake ave., and also improvement of latter street, from Market to Old Niagara rd. to connect with improved road running to Wrights Corners. Resolution provides that these streets shall be improved as State and county roads.

Lowville, N. Y.—Paving of State st., from South Campbell st. to Bostwick st., is being considered; estimated cost to village, $15,000.

Newburgh, N. Y.—City Council has been authorized to improve Broadway, from Mill st. to West st., by paving.

Poughkeepsie, N. Y.—It has been ordered that North Hamilton st., from Mill to south side of Cottage st., be paved with asphalt and that North Hamilton st., from north side of Cottage st. to south side of North st., be paved with bituminous macadam.

Oswego, N. Y.—Board of Supervisors has approved construction of two highways. First, known as Pulaski-Williamstown rd., at total cost of $70,189.92, to be apportioned as follows: New York State, $43,911; county of Oswego, $22,304; town of Albion, $3,485; village of Altmar, $489.92. Second is known as Volney-Palermo highway, length of which will be 5.22 miles. Total cost of road will be $66,400, divided as follows: New York State, $41,465.65; Oswego County, $21,-248; Volney, $1,282.21; Palermo, $2,404.14.

Rochester, N. Y.—Ordinance will be introduced in Common Council providing for new pavement in Jennings st.; estimated cost, $35,000.

Rochester, N. Y.—Ordinances are being considered as follows: Chestnut st. brick pavement, estimated cost, $21,000; Northview Terrace asphalt pavement, $10,000; Jennings nd Goodman st. sewer, $25,000; Johnson st. Medina stone pavement, $4,500; Regent pl. opening and extension, $1,500; Engel pl. brick pavement, $2,100; general street sweeping, cleaning and flushing.

Rochester, N. Y.—Monroe County has been awarded appropriation of $245,000 for 23 miles of good roads. Following are roads to be built: Honeoye Falls-Rush rd., 4.1 miles long, 16 ft. wide part of way and 12 ft. wide remainder, at an estimated cost of more than $60,000. Road is to be of Rocmac construction. Fairport-Nine-Mile-Point rd., 11.41 miles in length, extending from Lake Ontario south to town line of Webster, which part of road will be of asphaltic concrete construction; from there to Fairport, of Rocmac construction and in Fairport Village of brick construction, whole to be 16 ft. in width. It will cost approximately $150,000. Walker-Lake Ontario rd., in Hamlin, to be 3.75 miles in length and to be 12, 14 and 16 ft. in width at different parts and of Rocmac construction. It will connect Clarkson with lake. It will cost about $55,000. Ruggsley Hill rd. will be .48 miles long, 16 ft. in width at 7 per cent. grade over hill and will cost $10,500. Up to high hill on each approach there is good road. Monroe-Orleans rd., county line thoroughfare, half of cost to be borne by each county, 2.8 miles in length and 14 ft. in width, connecting two counties. It will be of bituminous surface. Cost will approach $40,000. Last road will be Spencerport-North Chili rd. which will be .52 miles long and 16 ft. wide, and will connect two trunk lines, already completed. It will be of Rocmac construction and will cost about $6,000.

Syracuse, N. Y.—Resolutions have been adopted by Board of Supervisors, providing for construction of State and county roads to cost $321,332. Bids will be advertised and contracts awarded in couple of weeks.

Yonkers, N. Y.—Resolution has been adopted instructing City Engineer to draw plans for grading Winifred ave., from Vernon ave. to Bronx River rd.

Yonkers, N. Y.—Plans for widening of North Broadway, from Dock st. to point near Locust st., have been submitted to Common Council, by City Engineer Cooper.

Durham, N. C.—Issuance of $250,000 in bonds for building roads in Orange County will be voted on.

Newton, N. C.—Newton Township has voted $50,000 of bonds for better roads.

Cheviot, O.—Bids will be received until 12 noon, April 9, by Clerk of Village, for purchase of $4,820 worth of bonds for improvement of Herbert ave. by grading, etc. Charles Craig, Village Clerk.

Cleveland, O.—Bids will be received until 12 noon, March 25, at office of City Auditor, for purchase of $450,000 street improvement coupon bonds. Thomas Coughlin, City Auditor.

Dayton, O.—Bids will be received until 12 noon, April 9, at office of City Auditor, for purchase of $8,000 worth of bonds for paving of Forest ave., from Lehman st. to Main st. Geo. W. Bish, City Auditor.

Dayton, O.—Resolutions have been adopted for paving of various streets.

Dayton, O. — Ordinances have been passed establishing grades of various streets. Wm. D. Huber, President of Council.

Massillon, O.—Resolutions have been passed for repaving of Main st. and S. Erie st., and for paving portion of S. Erie st. and West Tremont st.

Youngstown, O.—Resolutions are being considered for paving and grading of various streets.

Youngstown, O.—Ordinance has been passed providing for improvement of Cedar st., between Poland ave. and East Federal st bridge, by paving.

Youngstown, O.—Resolution has been passed for paving Wellendorf ave., between Ohio and Logan aves.

Youngstown, O.—Bids will be received until 2 p.m., March 25, at office of City Auditor, for purchase of $12,000 spring common grade crossing bonds; $3,000 Madison ave. extension bonds; $36,260 Glenwood ave. paving bonds; $8,250 Warren ave. paving bonds, and $10,610 Dewey ave. paving bonds.

Youngstown, O.—Bids will be received until 2 p.m., April 5, by Road Commissioners for purchase of $200,000 worth of bonds for building and improving roads in Mahoning County. Frank Agnew, Secretary.

Youngstown, O.—Bids were opened by Good Roads Commissioners on work of macadamizing town line road between Boardman and Beaver Townships, from Woodworth to New Buffalo, distance of 2½ miles. C. J. Chinnock, of Warren, was lowest bidder, his figure being $13,-887.47.

Erie, Pa.—Ordinances are being considered for improvements to various streets.

Erie, Pa.—Ordinances for paving East 26th st. and for other improvements have been approved by Mayor W. J. Stern.

Harrisburg, Pa.—Bids will shortly be advertised for straightening and widening of River rd. by Highway Commissioners.

Johnstown, Pa.—Special election will be held in Dale Borough on April 13 at which voters will be given opportunity to pass judgment on proposed $25,000 bond issue for purpose of street improvement. Borough Engineer O. P. Thomas has submitted estimates as to probable cost of contemplated improvements. These estimates follow: Cliff st., to be paved from Daniels to Cummings st., $2,680; Strayer st., to be paved from Bedford st. to borough line, $5,885; to build retaining wall near Martin st., $1,000; Cummings st., to be graded and gutters paved from Strayer st. to Cliff st., $300; Hummel st., to be graded and gutters paved from Strayer st. to Cliff st., $300; Pickworth st., to be paved from Daniels alley to Heber alley, $708; Daniels alley, to be graded and gutters paved from Bedford st. to Addleman alley, $200; total for the hill, $11,073. Von Lunen st., to be paved from Bedford to McMillen st., $3,654; Messenger st., to be paved from Von Lunen to David st., $1,683; Lemon st., to be paved from Dewey ave. to Annie ave., $795; Hurton st., to be paved from McMillen st. to Bloom st., $1,-080; McMillen st., to be paved from Von Lunen st. to Hurton st., $1,105; Clark st., to be paved from Von Lunen st. to Hurton st., $1,215; Bloom st., to be paved from Von Lunen st. to Hurton st., $1,065; Nathaniel st., to be paved from Dewey ave. to Annie ave., $795; Dewey ave., to be paved from Lemon to Hurton st., $563; total for Terrace account, $11,955. All moneys remaining after above work is completed to be expended in further street improvements.

Marlborough, Pa.—Petition has been made for State and county aid for reconstruction of Kutztown rd.

Pittsburgh, Pa.—Department of Public Works will advertise for bids on reduction of Grant st. "Hump," to be opened on March 25.

Pittsburgh, Pa.—Delegation of Natrona and Brackenridge citizens will visit County Commissioners to urge improvement of county road from Mile Lock lane to Natrona.

Scranton, Pa.—Ordinances have been passed providing for grading, curbing and paving of various streets.

York, Pa. — Councilmen are planning number of street improvements for West York.

Quakertown, Pa.—Quakertown Council has appropriated $2,500 for improvement of streets.

Mitchell, S. Dak.—Plans are being considered for building cross-State highway from Sioux Falls, Rapid City and other points in Black Hills.

Corsicana, Tex. — City Council has adopted resolution ordering election to be held in Corsicana April 26 to determine whether or not this city will adopt State law regulating paving of streets.

Dallas, Tex.—Petitions have been filed with Board of Municipal Commissioners asking for paving with creosoted wooden blocks on Wood st., from Ervay to Harwood, and on Young, from Akard to Harwood.

Dallas, Tex.—Board of Municipal Commissioners has ordered paving of Exposition ave., from Main st. to Parry ave.

Gainesville, Tex.—Agreement has been reached by members of County Commissioners' Court to dispose of $100,000 issue of good road bonds to be used in building roads in this precinct. Work will be commenced at once.

San Antonio, Tex.—County Commissioners have ordered County Auditor to advertise for bids for grading Culebra rd., from 11¾-mile point to 19-mile post and for grading Brown-Hoffman rd., from Culebra rd. north for about three-quarters of mile.

Manassas, Va.—If people of Prince William County support action of Board of Supervisors in asking Judge Thornton to order election on question of issuance of bonds, $135,000 will be spent in county for permanent road improvement.

Norfolk, Va.—Appropriation of $2,700 has been made for improvements on 27th and Leo sts., and $660 for improving Mt. Vernon st.

Norfolk, Va.—Appropriations are being considered for improvements to various streets.

Richmond, Va.—Council has adopted joint resolution instructing Committee on Streets to prepare plan for general improvement of streets over period of three or four years, at cost of $1,000,000, fund to be provided by bonds and sub-committee has been appointed in Street Committee to select streets to be improved, and procure estimates of cost of work.

Everett, Wash. — Improvements are being considered for 26th st., from East Grand to Cleveland aves.

South Bend, Wash.—City Council has adopted resolution for regrading of Water st., between Spruce and Weir sts., at cost of $15,000.

Tacoma, Wash.—Bond issue of $1,000,-

000 for highway improvements is being considered by Yakima County.

Tacoma, Wash.—Ordinances have been passed providing for issuance and sale of $45,000 bonds for construction of hard surface pavement on Delin st. and to S. Tacoma; for improvement of Center st. and other streets in District 828, and for submission to qualified voters on bond issue of $125,000 to build certain hard surface roads.

Tacoma, Wash.—Voters will be asked to vote on following issues as follows: Constructing extension of Jefferson ave. to Center st., $15,000; paving Lincoln parkway, including De Lin and other streets along route of South Tacoma car line to Union ave., $45,000; building hard surface road in conjunction with county to South Tacoma, $25,000; also for $22,-000 to help pave North I st., from Division ave. to North 13th st. and for $35,-000 for building roadway on lower deck of new 11th st. bridge.

Milwaukee, Wis.—County Board has voted appropriation of $30,000 for improving various county highways.

CONTRACTS AWARDED

Los Angeles, Cal.—To C. W. Shafer, 1614 Temple st., Los Angeles, for street improvements, grading, etc.

Oakland, Cal.—By City Council, for paving western half of Bruce st., from northern line of East 34th st. to southern line of Hopkins st., to Hutchinson Co.

Oakland, Cal.—By Council, for laying of sidewalks of East 30th st., from southeastern curb line of 14th ave. to northwestern curb line of 21st ave., to E. E. Rollins, at 14 cts. per sq. ft.; also for laying sidewalks on East 22d st., to E. E. Rollins, at 14 cts. per sq. ft. Frank R. Thompson, City Clerk.

Oakland, Cal.—By City, for sewer construction as follows: To John Geary, furnishing and laying 8-in. pipe, at $1.28 per lin. ft.; furnishing and laying "Y" branches, at 50 cts. each extra; removing 8-in. sewer pipe, 1 ct. per lin. ft.; removing two lampholes, 5 cts. each; constructing brick manholes, with covers, complete, $62 each; deepening of existing manholes, $15 each.

Oakland, Cal.—By City, for street improvements, to C. W. Cross, at following prices: Grading street, including sidewalk (cutting), 2 cts. per sq. ft.; grading street, including sidewalk (filling), 2 cts. per sq. ft.; macadamizing, 9½ cts. per sq. ft.; curbing with redwood, 12 cts. per lin. ft.; culverts, corrugated iron, $3 per lin. ft.; gutters, concrete, 15 cts. per sq. ft.; regrading, 4 cts. per sq. ft.; repaving, 10 cts. per sq. ft.; recurbing, 12 cts. per lin. ft.

Oakland, Cal.—By City, for improvement of 14th st., to City Improvement Co., at following prices: Curbing, $1.25 per lin. ft.; gutters, .407 per sq. ft.; asphalt pavement, .205 per sq. ft.; grading, .02 per sq. ft. For improvement of 22d st., to Ransome-Crummley Co., at following prices: Grading street (cutting), 2 cts. per sq. ft.; grading street (filling), 2 cts. per sq. ft.; curbing with concrete, 70 cts. per lin. ft.; gutters, concrete, 16 cts. per sq. ft.; asphalt pavement, 20 cts. per sq. ft.; also for improving Harrison st., to Oakland Paving Co., at following prices: Grading st. (cutting), 2½ cts. per sq. ft.; curbing, granite, $1.30 per lin. ft.; gutters, brick, 36 cts. per sq. ft.; asphalt pavement, 19½ cts. per sq. ft.; catch basins, $45 each; pipe conduits, 70 cts. per lin. ft. Frank R. Thompson, City Clerk.

Pasadena, Cal.—For street improvements, by City Council, as follows: Work on El Molino ave., to J. C. Kinsman, for $16,784; street improvement work on Meredith ave., to J. E. Haddock, for $3,-235.96; work on Mountain st., to J. C. Kinsman, for $5,260.70; Work on Garfield ave., to J. E. Haddock, for $9,290.84; work on Curtis st., to Cox & Mathews, for $3,-988.62; work on Wilson ave., to W. A. Dontanville, $548.39.

South Pasadena, Cal.—By Board of City Trustees, for paving Pasadena ave. and Mission st., to Andrew Holloway, of Pasadena, at $63,929, which was more than $15,000 less than City Engineer's estimate.

Bridgeport, Conn.—To Burns Co., of this city, by Director of Public Works J. A. Courtade, for sprinkling streets for period of one year. But two bids were received, that of Burns Co. being for $34,-638.91, while that of American Car Sprinkler Co., of Worcester, Mass., being $36,-585.64.

Atlanta, Ga.—By City, to Southern Tile & Stone Co., for paving sidewalks with tile, and to Cement Tile & Stone Co., for repair tile work.

East Moline, Ill.—By Board of Local Improvements, for laying 11,300 lin. ft. 5-ft. concrete walks and 1,170 lin. ft. 10-ft. walks, to Abraham-Porter Construction Co., for $10,740.

Joliet, Ill.—By Board of Local Improvements, for paving portion of Scott st., to Wm. Tunney, of Joliet, for $19,266.

Morris, Ill.—By City Council, as follows: For paving Benton st. with brick, to Keys & McNamara, La Salle, Ill. Bids were as follows: I. D. Lain, Bloomington, Ill., $27,372; H. C. Finley, Hoopeston, Ill., $24,794; S. A. Tuttle, Decatur, Ill., $25,465; A. E. Rutledge, Rockford, Ill., $24,715; Jansen & Zoeller, Pekin, Ill., $25,722; Keys & McNamara, La Salle, Ill., $24,399. For paving Washington st. with asphalt: A. E. Rutledge, Rockford, Ill., $20,183; I. D. Lain, Bloomington, Ill., $22,094; Jansen & Zoeller, Pekin, Ill., $22,990; Keys & McNamara, La Salle, Ill., $19,875; S. A. Tuttle, Decatur, Ill., $20,795; H. C. Finley, Hoopeston, Ill., $20,583. The contract for both projects was awarded to Keys & McNamara, La Salle, Ill.

Evansville, Ind.—For sprinkling city streets, to Henry Korff, Jr. & Co., bid presented by firm being just five cents lower than bid presented by August B. Igleman. Mr. Korff's bid was $26.35 per great square, and Mr. Ingleman's bid was $26.40.

Fort Wayne, Ind.—To John and Edward Grosjean, for building walks on Columbia st., seven-foot portion from Nickel Plate tracks to Columbia st. bridge, at 83¾ cents a foot, and five-foot walks from bridge to Crescent ave., at 59¾ cents.

Ft. Wayne, Ind.—By Board of Public Works, for portable asphalt repair plant, to Hetherington & Berner, of Indianapolis, for $4,685 and 5-ton tandem steam street roller, to Kelly-Springfield Road Roller Co., of Springfield, O., for $1,575.

Indianapolis, Ind.—By Board of County Commissioners, for crushed stone, to be used on roads as follows: A. F. Zearing Co. will supply 130 carloads; the Ohio & Indiana Stone Co., 40 cars; A. B. Meyer Co., 40 cars. Prices range from 99 cts. to $1.15 a yd.

Indianapolis, Ind.—For constructing roads as follows: Between Hendricks and Marion Counties, to A. M. Lisby, of Coatesville, gravel road, $6,095; between Pike and Steuben Townships, Warren County, to W. W. Crane, of Marshfield, gravel road, $8,739; in Jackson Township, White County, stone road, to Nathan C. Gibson, Idaville, $15,854; in Union and Brown Townships, Montgomery County, gravel road, to Patrick Lane & Sons, Crawfordsville, $5,195; on line between Waltz and Liberty Townships, Wabash and Grant Counties, gravel road, to David P. Brook, of Mier, $6,703; in Porter County three gravel roads, one to Crownpoint Construction Co., of Crownpoint, at $27,-603, and two to Green Construction Co., of Valparaiso, at $11,030.

Linton, Ind.—To Gabey & Cunningham, for $44,000 worth of macadam road in Fountain County.

South Bend, Ind.—For pavement of four downtown alleys and one court, by Board of Public Works as follows: First alley south of Emerick st., from LaSalle to Colfax aves., C. H. Defrees, $916.66; Carroll court, Sample to Tutt sts., C. H. Defrees, $1,146.96; second alley south of Wayne, from St. Joseph to Carroll sts., $813.20; first alley south of Washington ave., from William and Taylor sts., $495.-90; first alley south of Jefferson blvd., from Main to Lafayette sts., $861.28.

Alexandria, La.—By City, to Elmore Andrews, of Alexandria, for 15,000 sq. ft. 4-in. walks, at 13 cts. per sq. ft.; 3,-000 lin. ft. 6 x 20-in. concrete curb, at 45 cts. per lin. ft.

Davenport, Ia.—By Commissioner of Public Works, to Fey & Schaeffer, of Davenport, for 16,000 sq. yds. concrete pavement, 5-in. base, at $1.05 to $1.10 per sq. yd.; excavating, 35 cts. per cu. yd., and 18-in. concrete curb, 30 cts. per lin. ft.

Muskegon, Mich.—By City, for paving Clay ave., to E. C. Williams, of Grand Rapids, for $8,396.

Haddonfield, N. J.—For paving, to Kelly & McFeeley, of Camden, by Council, bid being $112,000. Contract, however, could not be signed, as bonds to pay for improvement have not yet been sold.

Murphy, N. C.—By Superintendent of Roads, for grading Hanging Dog rd., to Brittain & Calhoun, of Murphy, at 28½ cts. per cu. yd., unclassified.

Cincinnati, Ohio—By Board of Commissioners of Hamilton County, for improvement of Harrison pike, to John Snyder, 4436 Forest ave., Norwood, at $60,-794. Other bidders were J. Ruebel Construction Co., $61,293; E. C. Lockwood, $61,541; Nugent & Hines, $63,158, and William P. Flynn, $63,707.

Lisbon, O.—By County Commissioners, for grading Van Fossan Hill on new Baker-Riddle rd., which is now being opened from Elkton rd., two miles east of Lisbon, north through Walter and Armstrong farms, to R. R. Grimes, at 35 cts. per cu. yd., who has sublet contract to E. N. Morris and Charles Van Fossan.

Youngstown, O.—For general street improvements, by Board of Control, as follows: Grading Lawrence st., Youngstown Counstruction Co., for $627; grading Forest ave., J. A. Allen, for $815; grading Midland ave., from Salt Springs rd. to end of street, R. C. Shook, for $3,141; grading Richland ave., from Salt Springs rd. to Midland ave., M. M. Conley & Son, for $2,502.20; sewer and grading Marshall st., between Oak Hill ave. and West st., E. Diorio, for $3,053; piping and sewering in Dry Run district, from city lot No. 18,-444, to Truesdale ave., to P. & P. J. Grady, for $4,970.55; paving Charlotte ave., from Fruit st. to Truesdale ave., Mullen & Quinn, for $8,051.20; paving Dakota st., J. P. Morrison, for $3,140.85; piping and sewering Court, Harrison and Williams st., E. Diorio, for $1,185.50; piping and sewering Dry Run district between Oak st. and Truesdale ave., P. & P. J. Grady, for $9,732.36; repairing stone sidewalks, Michael Joyce; sidewalk repairs, Turner & Olson; cement sidewalks, Joyce & Ramm.

Corvallis, Ore.—To Warren Construction Co., of Portland, for bitulithic paving in Corvallis, to cost about $93,000.

Pittsburgh, Pa.—By City, to Barber Asphalt Paving Co., 50 Church st., New York, for grading, paving and curbing Atherton ave.

Fort Mill, S. C.—By City, to Legare Construction Co., of Columbia, S. C., at $3,875, to improve Main st. with bitumen binder.

Orangeburg, S. C.—By City Council, for construction of brick pavement at Lowman st., to Berbhaus & Fairey, Orangeburg, at $16,000.

Terrell, Tex.—By City Commission of Terrel, for constructing 4,447 lin. ft. of concrete sidewalk on North Blanch and E. High sts., to I. C. Sherwood.

Richmond, Va.—By City, to I. J. Smith & Co., at $25,000, for resetting curbing, flagging, roadbed, paving, etc., in connection with laying pipe sewers. Charles E. Bolling is City Engineer.

Chehalis, Wash.—By County, for constructing culvert and surfacing Cowlitz and Olympia rds., to Keasel Construction Co., of Tacoma, for $14,448.

Spokane, Wash.—By City Commissioners, for grading Latawah st. and 13th ave., to Abbott & Joslin, at $1,896.

Spokane, Wash.—By City Council, for paving Seventh ave. with bitu-mass, to Spokane Bitu-Mass Co., at $7,874.

BIDS RECEIVED

Spokane, Wash.—For paving Seventh ave., from Bernard to Howard sts., as follows: Abbott & Joslyn, with municipal plant, asphalt, $8,990; Warren Construction Co., bitulithic, $11,074; Spokane Bitu-Mass Co., bitu-mass, $7,874; Mitchell Bros., with municipal plant, asphalt, $9,700; Mitchell Bros., granitoid, $11,900; Inland Empire Hassam Co., hassam, $9,-300; Inland Empire Hassam Co., asphalt, with city plant, $10,084; Western Asphalt Paving Co., asphalt, $9,630; Barber Asphalt Co., asphalt, $9,655; Barber Asphalt Co., bitulithic, $10,005.

Spokane, Wash.—For improvement work, as follows: Grading, curbing, parking and sidewalking Match st., Hartson ave. to Ninth ave., estimate $11,500, Mitchell Bros., $11,390; Abbott & Joslyn, $11,485; Naylor & Norlin, $11,498. Same n 13th ave., Lamonte to Latawah st., and on Latawah, 29th to 30th, estimate $2,-000. Abbott & Joslyn, $1,806; Henry Logan, $1,985; A. Wold, $1,950.

SEWERAGE

Jackson, Cal.—Committee of Women's Improvement Club has been before City Trustees asking for assistance or action in matter of securing better sewerage for town.

Pasadena, Cal.—City Engineers Benjamin Dupuy, of South Pasadena; S. J. Van Ornum, of Pasadena, and R. H. Blackidge, of Alhambra, have presented their report on outfall sewer question to Inter-City Committee, recommending that purification plant be erected at some suitable point to take care of sewage of three cities, rather than that outfall sewer be constructed at this time.

Richmond, Cal.—City Engineer W. S. Farley, of Engineering Department of local municipal government, will shortly start work on plans for comprehensive sewer and surface drainage system de-

signed to meet both present and future growth of Richmond.

Oakland, Cal.—City Council has rescinded its action in awarding contracts for erection of sewers in Districts Nos. 1, 2 and 3, owing to irregularity in proceedings. This will hold up work for about 10 days as bids will have to be called for again and contracts awarded.

Oakland, Cal.—Resolution has been adopted for construction of sewer in 4th st., between Webster and Harrison sts. Frank R. Thompson is City Clerk.

Rio Vista, Cal.—Bond issue of $25,000 has been voted for installation of sewer system.

San Francisco, Cal.—Board of Public Works has decided to request Supervisors to allow $160,000 for construction of Sunset district sewer across Golden Gate Park at 48th ave., from Lincoln Way to Cabrillo st.

Lakeland, Fla.—Board of Bond Trustees are busy getting ready for improvements to sewers and streets at cost of $150,000.

Atlanta, Ga.—Following sewer improvements are planned: Laying of sewer, 1,000 ft. on both sides of Ponce de Leon Park and baseball park to take care of sewer branches in that vicinity; building of 400 ft. of sewer on Highland ave., reaching Southern Railway; building of 500 additional feet of sewer at McDaniel st. outlet, and completion of Proctor Creek sewer.

Milledgeville, Ga.—Plans have been decided upon by City Council to extend sewerage system of Milledgeville throughout southern section of city.

Fort Dodge, Ia.—Members of City Council has passed resolution for sanitary sewer which will drain Round Prairie and north end of city. This sewer will be 5.91 miles long, according to figures prepared by C. H. Reynolds, City Engineer. City Clerk W. L. Tang says it is longest single project in State, except one at Des Moines. Sewer will empty into Des Moines River.

Louisville, Ky.—Proposition may be submitted at regular election for bond issue of $2,000,000 for lateral sewers.

Vivian, La.—Plans are being prepared for municipal sewer system.

Marion, Mass.—Appropriation of $1,000 has been made for sewer extension on Pitcher st.

Duluth, Minn.—Two methods of constructing sanitary sewer on Park Point, from canal to 38th st., are being considered; estimated cost of plans are, respectively, $20,000 and $15,000.

Duluth, Minn.—City Engineer has been directed to prepare plans and specifications for gravity sewer on Park Point. Proposed plan will provide for construction of sewer in sections of about six blocks each. Sewage will flow to common center of each segment and empty into bay through septic tank; cost about $15,000.

Minneapolis, Minn.—Bids will be received until 2 p.m., March 28, by Committee on Ways & Means of City Council, for purchase of $175,000 main sewer bonds. Dan C. Brown, City Comptroller.

Goffstown, N. H.—It has been voted to install sewer system.

Perth Amboy, N. J.—Proposition of extending new 24-in. main on southerly side of Raritan River is being discussed.

Niagara Falls, N. Y.—Sewer work to cost $214,000 has been approved at special meeting of Board of Public Works and sent to committee by Common Council. Principal sewer proposed is in 24th st., from Falls st. to Ontario ave., estimated to cost $148,000. This would be 78-in. sewer about one and two-thirds miles long. Second largest of proposed sewage system in east side, is 48-in. sewer in 27th st., from Niagara st. to Michigan ave., estimated to cost $55,000. This sewer would drain about 130 acres. City Engineer Parkhurst.

Rochester, N. Y.—T. A. Gillespie Co., of New York, is lowest bidder at $265,254 for construction of outlet sewer to extend 7,000 ft. into Lake Ontario. Other bids as follows: Hiram W. Phillips, $405,164; Lake Erie Dredging Co., $297,420; Houston-Barnard Co., $321,644, and Central Dredging Co., $293,707.

Rochester, N. Y.—Recommendation of City Engineer Fisher that $1,000,000 be appropriated for work on new intercepting sewer will probably be reported on favorably.

Dayton, O.—Plans have been submitted by City Engineer Cummin for construction of sanitary sewers in District No. 8.

Hubbard, O.—Seasongood & Mayer, of Cincinnati, have been awarded sanitary sewer 5 per cent. bonds.

Massillon, O.—Construction of sanitary sewers in Mill and Tremont sts. has been authorized.

Springfield, O.—Sewer Committee has planned construction of sewers in various streets.

Youngstown, O.—Resolution has been adopted for construction of sewer in Hezlep st., from Wells st. to Crescent st., and in Young and Dakota sts.

Dallas, Tex.—Assistant City Engineer Eugene Couch is working on plans for big storm sewer and retaining wall to preserve grounds of David Crocket School on Carroll ave., East Dallas, from overflow from Peak Branch.

Colonial Beach, Va.—Bond issue of $20,000 has been voted for construction of sewer system.

Harrisonburg, Va.—Town Council has made appropriation of $4,000 for extension of sewer system 3,500 ft. further south.

Sultan, Wash.—Construction of sewer system is being discussed.

Milwaukee, Wis.—Ordinance has been recommended providing a $265,000 bond issue for beginning work on Menominee River flushing tunnel; estimated cost about $1,200,000.

Racine, Wis.—Common Council has adopted report of committee of whole in favor of submitting to people question of issuing $185,000 of bonds for construction of three trunk sewers, one on each of natural subdivisions of city; also resolution directing City Clerk to place bond issue question upon official ballot.

Cody, Wyo.—Detailed plans have been completed for sanitary sewers to be built at estimated cost of $35,000; bond election has been called for April 16 for these improvements. Burns & McDonnell, Engineers, Scarritt Bldg., Kansas City, Mo.

CONTRACTS AWARDED

Ft. Smith, Ark.—For constructing certain storm water sewers, to Williams, Hayes & Paine, of Ft. Smith, for $12,847.

Fort Wayne, Ind.—To Moellering Construction Co., for constructing local sewer in South Wayne, at $1.26 per ft.

Fort Dodge, Iowa—For construction of 8-in. sanitary sewers in First and Second aves., to W. E. Rosecrans, Fort Dodge, at 46 cts. per lin. ft.

Sioux City, Ia.—To Block Construction Co., of Waterloo, and Cady & Savonell, of Sioux City, for sewers; total cost, $16,000.

St. Paul, Minn.—For constructing Thomas-Van Buren sewer system, by Board of Public Works, to Pastoret-Lawrence Co., for $43,480; work includes 19,273 ft. 8- to 36-in. vitrified pipe sewers, 904 ft. 48- and 54-in. circular reinforced concrete with 97 manholes and 100 catch basins.

Stillwater, Minn.—For constructing outlet sewer on South Hill, to Fraser & Danforth, Stillwater, at $11,500. Other bids were: Edmund T. Sykes, $11,671; J. J. Connolly, $12,395; P. J. Ryan, $11,711; Pastwiet Lawrence Co., $12,381; E. T. Webster, $11,709; Teesbury & Olson, $13,458. Lewis W. Clarke is City Engineer.

Moorhead, Miss.—By Sunflower County Drainage Commissioners, for preliminary survey of Moorhead drainage district, was awarded to L. W. Washburn, of Clarksdale, who is to begin work at once.

Columbia, Mo.—For constructing sewers in Districts 32A and 32B, to Columbia Paving Co., for $8,481.

Kansas City, Mo.—By Board of Public Works, to T. W. Roberts, at $30,908, to construct intercepting joint district sewer to extent from 30th st. and Cleveland ave. to Raytown rd.

Macon, Mo.—By City, for constructing sewer No. 27 of salt-glazed vitrified earthenware pipe, 7,166 ft. 30- to 10-in. pipe, intakes, etc., to Kelly Construction Co., of St. Joseph, Mo.

Union, Mo.—By City, to W. W. Cook & Son, of Manhattan, Kan., for constructing sanitary sewer system, for $8,211.

Rochester, N. Y.—For big outlet sewer, by Board of Contract & Supply, to T. A. Gillepsie Co., of New York City, for $265,254, lowest of five bids received. Contract for 3,000 net tons of cast iron pipe and castings for Water Works Department and new sewage disposal system, to United States Cast Iron Pipe & Foundry Co., of Buffalo, lowest bidder, for $70,185.

Rochester, N. Y.—By Board of Contract & Supply, to Schroeder-Hicks Constructing Co., at $1,008, for Blossom rd. storm water sewer.

Youngstown, O.—By Board of Contract, for sewer and grading Marshall st., to E. Diorio, at $3,053; piping and sewering in Dry Run district, to P. & P. J. Grady, at $4,970.55; piping and sewering Court, Harrison and Williams st., to E. Diorio, at $1,185.50, and for piping and sewering Dry Run district, between Oak st. and Truesdale ave., to P. & P. J. Grady, at $9,732.36.

Sallisaw, Okla.—By City, to Oklahoma Engineering Co., Oklahoma City, Okla., for sewer system.

Altoona, Pa.—By Board of Public Works, as follows: To J. L. Wilson, for sewer in 16th st., between 21st and 24th aves.; to Saupp & Herr Co., for sewer in 23d ave., between Fifth and Ninth sts.; to Bell-Bockel Stone Co., for storm sewers in 16th st., between 20th and 22d aves., and in 19th alley, to J. P. Hadney, for sewer in Spruce alley, between 18th and 19th sts.

St. Elmo, Tenn.—For construction of complete sewer system, to Dyson Construction Co., Atlanta, Ga., at $58,163. Other bids were as follows: Irwin & Conkling, Greenville, Ohio, $76,941; M. P. Flynn & Co., Chattanooga, $74,719; Sullivan, Long & Haggerty, Bessemer, Ala., $70,203; Noll Construction Co., Chattanooga, $64,734; Dunn & Lallande Bros., Birmingham, Ala., $64,160; Guild & Co., Chattanooga, $63,244.

Richmond, Va.—By City, to National Construction Co., at $6,167.70, for pipe sewers on U st., from 20th to 23d st.; 23d st., from U st. to city limits; Jacquelin st., from Lady st. to Allen ave.; Blair st., from Lady st. to Allen ave.; Ashland st., from Randolph to South Lombardy st.; Windsor st., from Sumter st. to Allen ave.; to H. L. Driscoll & Co., at $1,392, for pipe sewers on Kemper st., from Lady st. to Allen ave.; to J. B. Chewning, at $226.29, for pipe sewers on Vine st., from Grove to Floyd ave.; for sewer on Leonard st., to A. W. Maynard, at $9,069; for resetting curbing, flagging, roadbed, paving, etc., to I. J. Smith & Co., at $25,000. C. E. Rolling is City Engineer.

Spokane, Wash.—By City Commissioners, to J. L. Wood, for putting in First Ward subtrunk sewer No. 8.6, at $9,445.

Durand, Wis.—For constructing 16,000 ft. of pipe sewers, by city, to F. C. Robinson & Co., Durand, at 29 cts. for 4-in., 32 cts. for 6-in., and 34 cts. for 8-in. pipe.

BIDS RECEIVED

Baltimore, Md.—For Sanitary Contract No. 19, storm water drains as follows: B. B. Sweeten & Son, 1500 E. Madison st., Baltimore, Md., $51,284.85; Jas. Ferry & Sons, Inc., Pittsburgh, Pa., Grafton Sta., $59,405.95; the J. Connelly Construction Co., 429 Schofield Bldg., Cleveland, O., $59,835.25; Ryan & Reilly Co., 612 Union Trust Bldg., Baltimore, Md., $61,093.55; Gallagher, Boyle & Muller, 120 Law Bldg., Baltimore, Md., $61,419.80; Wm. McCarthy & Co., 3 Oliver st., Baltimore, Md., $63,877.10; the Whiting-Turner Construction Co., Sexton Bldg., Baltimore, Md., $67,893.55. Calvin W. Hendrick, Chief Engineer.

Sallisaw, Okla.—For constructing sanitary sewer system and disposal plant from plans of Winters & Dove, 810 First National Bank Bldg., Ft. Smith, Ark., and lowest bid was submitted by Manson & KKress, of Muskogee, as follows: Furnish and lay sewer pipe: 4,710 ft. 18-in., 75 cts.; 2,350 ft. 15-in., 60 cts.; 1,090 ft. 12-in., 40 cts.; 2,310 ft. 10-in., 30 cts.; 39,150 ft. 8-in., 16 cts. Excavating and refilling trench: 26,100 ft., less than 6 ft. deep, 11 cts.; 18,400 ft., 6 to 8 ft. deep, 13 cts.; 4,200 ft., 8 to 10 ft. deep, 18 cts.; 600 ft., 10 to 12 ft. deep, 30 cts.; 400 ft., more than 12 ft. deep, 50 cts. Furnishing material and building manhole: 90 ft., 5 ft. deep, $21; 115 ft., additional depth of manhole, $2.50; 14 ft., flush tank, $65; 17 ft. lamphole, $3.30; 25 cu. yds. extra Portland concrete, $7.50; 500 cu. yds. rock excavation, $1.50; 84 ft. 8-in. cast iron pipe, Class A, $1.25; 2,395 ft. ¾-in. galvanized iron pipe, 10 cts.; 1,750 cu. yds. earth excavation for disposal plant, 80 cts. Furnishing material and building disposal plant, $3,000. Total cast, $27,560. Time of completion, 4 months. Totals of other bids: Tonkawa Construction Co., Tonkawa, $30,492; Hoosier Construction Co., Joplin, Mo., $33,375; Heman Construction Co., Muskogee, $36,776; J. S. Terry Construction Co., Poteau, $33,798; Muskogee Construction Co., Muskogee, $38,717; Commercial Construction Co., Kansas City, Mo., $32,577; J. O. Severns, Oklahoma City, $31,279; Reinhart & Donovan, Oklahoma City, $31,034; N. S. Sherman Machine & Iron Co., Oklahoma City, $37,914; Oklahoma Engineering Co., Oklahoma City, $29,088; F. P. Dellone & Co., Independence, Kan., $40,218; Concrete Construction & Engineering Co., Iola, Kan., $33,640; F. S. Smedley, Muskogee, $33,142; Bagby & Gooch, Vinita, $32,334; Hamilton Bros. Construction Co., Chicago, Ill., $31,124; A. J. Wells, Muskogee, $33,148; Hunter & Hunter, Oklahoma City, $35,719; Kennedy & Fleming, Oklahoma City, $35,425; F. R. Stone, Oklahoma City, $35,391.

Scranton, Pa.—For construction of

borough sewer, as follows: Contractor Brown, of Duryea, $45,709.19; James Costa, $45,273.76; C. B. Snyder & Co., $41,693.78; Antonio Biancardi, $44,999.49; Monie & Co., 10 per cent. of entire cost, borough to furnish materials; M. Stipp, of Scranton, $50,950; Retta & Santolfi, $43,956; Attorney W. J. Douglas, 10 per cent of cost for furnishing contractor; Stephen Flanagan & Son, $39,974.09; J. T. Reilly, $44,886. Low bid was Flanagan & Son, of Scranton.

Seattle, Wash.—For construction of sewers in 25th ave. north, as follows: J. N. Johnson & Co., $18,353.50; McGuire & Moon, $17,089.80; Becker & Walker, $19,182.65; Frasea & Colusco, $18,670.81; C. Michael, $16,898.65; Krogh & Jessen, $17,667.70; Young & Uhrich, $17,583.40; Dahlstrom & Rodal, $16,783.10; J. Ruthe, $14,977.65; T. I. Peterson, $17,987.20; Dicken & Rightmire, $18,875.50.

Spokane, Wash.—For First Ward subtrunk sewer No. 8.6, estimate $18,318, S. Burgie, $12,800; A. L. Wood, $9,445; DeCamp & Cheatham, $10,338; Lang & Smith, $12,460; James C. Broad, $10,065. First Ward subtrunk sewer No. 17, estimate $20,695, Lang & Smith, $34,860; DeCamp & Cheatham, $33,942.

WATER SUPPLY

Stevenson, Ala.—Voters have decided in favor of bond issue for building of good system of waterworks.

Rio Vista, Cal.—Bond issue of $25,000 has been voted for enlarging municipal water system.

Santa Anna, Cal.—Bids will be advertised at once for construction of auxiliary water system by Board of Trustees.

Ocola, Fla.—City is considering purchase of Acola Water Co.

Augusta, Ga.—Taxpayers will vote in April on $350,000 to $400,000 bond issue for improvements to waterworks system.

Stites, Idaho—Council is considering construction of waterworks.

East Moline, Ill.—Taxpayers will vote on special bond issue for erection of waterworks plant.

Mishawaka, Ind.—Common Council has authorized City Comptroller to advertise for sale of city bonds to extent of $70,000. This money will be used for construction of new waterworks in East Mishawaka to pump water into city mains.

Central City, Ia.—City has voted bonds for installation of waterworks system.

Defiance, Ia.—Citizens will vote on $8,000 bond issue for installation of waterworks system.

Lyndan, Kan.—Plans are being prepared by J. W. Mavity, Consulting Engineer, for waterworks system to cost about $16,500.

Newport, Ky.—At meeting of Commission Mr. Bauer urged members to take steps at once to secure perfection of incinerator and filter for local waterworks.

Vivian, La.—Plans are being prepared for municipal waterworks system.

Shreveport, La.—A. Josey, of Beaumont, was lowest bidder for contract of $3,700 to drill fresh water well for fire protection and salt water well for public natatorium on Louisiana Fair Grounds. Provision in the bid indicates that the drillers expect to strike oil or gas.

Myersville, Md.—Election will be held for voting on bond issue for waterworks system; cost about $8,000.

Boston, Mass.—Commissioner Rourke, of Public Works Department, has decided to place high pressure pumping station somewhere in Charles River basin.

Ann Arbor, Mich.—Citizens of Ann Arbor will be given opportunity to vote April 1 on proposition to bond city for $600,000, money to be used for purchase of waterworks plant now operated under private ownership.

Brighton, Mich.—Installation of municipal waterworks system is being considered by Board of Commissioners; estimated cost, $20,000.

Grand Haven, Mich.—Bonds in sum of $40,000 have been voted for extension of waterworks system.

Grand Rapids, Mich.—Alderman Joseph Renihan will introduce resolution to Council asking that $100,000 bond proposition for extension of water mains be submitted to people at regular spring election.

Wellsville, Mo.—Taxpayers will vote in April on $18,000 bond issue for waterworks.

Kenilworth, N. J.—At special meeting of Borough Council proposition of Plainfield-Union Water Co. to install system in this place was adopted.

Millville, N. J.—Special meeting of Millville City Council will be held to consider question of purchasing plant of People's Water Co. for $162,500.

Chatham, N. Y.—Proposition to purchase waterworks plant at sum not to exceed $50,000 will probably be submitted to people at coming election.

Oneida, N. Y.—City is considering installation of water softening plant to cost about $25,000.

Williamsville, N. Y.—Voters have indorsed proposition to raise $3,000 by bond issue for extension of water mains.

Wolcott, N. Y.—Plans are being considered for municipal waterworks system to cost $35,000.

Cheviot, O.—Bids will be received until 12 noon, April 9, by Clerk of Village, for purchase of $4,000 worth of bonds for extension of water service. Charles Craig, Village Clerk.

Dayton, O.—City Council has passed ordinance for issuance of waterworks bonds in sum of $120,000.

Youngstown, O.—Bids will be received until 2 p.m., March 25, at office of City Auditor, for purchase of $50,000 waterworks extension bonds.

Youngstown, O.—Plans for building of 50,000,000-gal. reservoir on north side, and standpipe on south side, at cost of $200,000, are being discussed.

Butte Falls, Ore.—Construction of gravity water system has been authorized, and $10,000 bond issue voted for that purpose.

Marsnfield, Ore.—Sum of $20,000 will be expended for improvements to waterworks plant.

Aspinwall, Pa.—Plans have been approved for waterproofing filter beds in waterworks plant at cost of about $175,000.

Homestead, Pa.—Estimates will be furnished by Chester & Fleming, of Pittsburgh, for improving waterworks plant.

McKeesport, Pa.—Numerous improvements in city's water system, including new distributing service, absolutely new power station, intake in Monongahela River, standpipe on highest point in city and various other changes, for which bond issue of $500,000 to be voted on by people, would be necessary to put them in effect, have been recommended to Councils by Water Commissioners.

Philadelphia, Pa.—Twenty members of Councils from West Philadelphia wards called on Morris L. Cooke, Director of Department of Public Works, and requested his support in effort to obtain $600,000 out of new loan of $4,000,000 to improve water supply from Belmont filtration plans. Improvements necessary consist of following: One 10,000,000-gal. pump at Belmont station; 48-in. pumping main from Belmont station to filter reservoir; 48-in. distributing main from Belmont filters to George's Hill reservoir and from that reservoir to southern section of West Philadelphia by way of 52d st.: rearrangement of Belmont preliminary filters so that their capacity can be increased from 40,000,000 to 60,000,000 gals. per day. Slow sand filters are ample to take care of that quantity of preliminary filtered water. Cost of above will be $600,000.

West Norriton, Pa.—Norristown Water Co. expects to extend its mains into adjacent township of West Norriton, and has made application for "West Norriton Water Co." charter.

Austin, Tex.—Attorney-General has approved of issue of $128,000 bonds for city of Cleburne waterworks, and $50,000 in bonds for improvement in waterworks.

Galveston, Tex.—Bids will be advertiser for repair of submerged section of duplicate water main under causeway, to cost about $4,000. City Engineer Dickey.

Hutto, Tex.—Waterworks system will be installed by Hanstrom & Tinning.

Colonial Beach, Va.—Bond issue of $17,000 has been voted for construction of waterworks.

Tacoma, Wash.—Ordinance has been passed providing for establishment of water warrant fund No. 3, for issuance of $300,000 in bonds for completion of Green River gravity water system.

Tacoma, Wash.—Commission has awarded $300,000 bond isue to Bolger, Mosser & Willaman, of Chicago, funds to be used for completion of gravity water project.

Culpeper, W. Va.—Installation of mechanical filtration plant is contemplated.

Superior, Wis.—Question if municipal ownership of water plant will probably be voted on at spring election.

Cody, Wyo.—Detailed plans have been completed for waterworks, including settling basins and filtration plant, and bond election has been called for April 16 for $65.000 for these improvements. Burns & McDonnell, Engineers, Scarritt Bldg., Kansas City, Mo.

Niagara Falls, Ont.—Waterworks Board has adopted resolution directing City Engineer and City Solicitor to petition Government for permission to sink new tunnel and wheel pit, and in fact to construct entirely new waterworks plant.

CONTRACTS AWARDED

Boaz, Ala.—By City, to J. B. McCrary Co., Atlanta, Ga., to construct electric plant, at cost of $6,250. W. H. Bartlett is Mayor.

Maricopa, Cal.—To Los Angeles Mfg. Co., of Los Angeles, for constructing 100,000-gal. iron tank and about two miles of steel water pipe for West Side Water Co.

Orange, Cal.—By Board of City Trustees, for furnishing city with cast iron pipe, valves, fittings and fire hydrants, to U. S. Cast Iron Pipe & Foundry Co., of San Francisco, for about $22,000.

Gunnison, Col.—For constructing water plant, to Central Colorado Construction Co., Colorado Springs, Col., at $67,500. Other bids were: Fisher-Dempsey Construction Co., of Pueblo, $83,900; Peter O'Brian Construction Co., Denver, $75,933; Hoosier Construction Co., of Joplin, Mo., $80,120; T. C. Brooks & Son, Jackson, Mich., $78,600; Marshall Bros., Las Animas, Col., $77,950; C. L. Wilbur, Gunnison, $72,000.

Hartford, Conn.—For making borings in connection with Nepaug extension of waterworks system, by Board of Water Commissioners, as follows: Item 1, sinking casing and core drilling for cores of less than 2 in. diameter, 3,200 lin. ft.; item 2, sinking casing and core drilling for cores of 2 in. or larger diameter, 300 lin. ft.; item 3, casing left in place, 2,000 lbs., to Sprague & Henwood, Inc., Scranton, Pa. (1) $4; (2) $5.50; (3) 5½ cts.; total, $14,560. Other bids as follows: Healey Contracting Co., 21 Park Row, New York (1) $6.79; (2) $6.79; (3) 6 cts.; total, $23,885. Engineer's estimate (1) $4.50; (2) $6; (3) 5 cts.; total, $16,300.

New Britain, Conn.—By Board of Water Commissioners, to R. D. Wood, of Philadelphia, Pa., to furnish city with 8,000 ft. of water pipe, at $22.20 a ton.

East Moline, Ill.—By City Council, to Chicago Bridge & Iron Works, Chicago, Ill., for construction of 500,000-gal. water tank.

Council Bluffs, Ia.—To American Cast Iron Pipe Co., of Birmingham, Ala., for about 10 miles of 4-, 6- and 8-in. pipe, to two 10,000-gal. per minute centrifugal pumps, to Platt Iron Works. Contract for valves and hydrants not yet let.

Kentwood, La.—By Town, for furnishing cast iron water pipe, to American Cast Iron Pipe Co., of Birmingham, Ala.; it bid for 350 tons 6- and 8-in. pipe at $26.85 per ton, and specials, $55 per ton.

Nevada, Mo.—For erecting 100,000-gal. steel water tower at State Hospital No. 3, by Board of Managers, to Memphis Steel Construction Co., Memphis, Tenn.

St. Louis, Mo.—To A. P. Smith Mfg. Co., of East Orange, N. J., for supplying Water Department with 1,350 non-freezing fire hydrants, at $35,000.

South River, N. J.—By Borough Council, for construction of concrete foundation for stand pipe which will be located on plot of ground near Tanner's Corner, to Marcus S. Wright, of South River, at $990. Other bids were: John J. McGovern, New Brunswick, $1,021; E. L. Matthies, South River, $1,125; Simpson-Corbett Company, New York, $1,235.

Charlotte, N. C.—For pumping station to drain Lake Mattamuskeet, involving $250,000, to Morris Machine Works. Plant contains 80 six-in. pumps, delivering 1,000,000 gals. a minute. Contract for drainage canal was let to Central Drainage Co., of Cleveland, O., involving $210,000.

McMinnville, Ore.—For relaying water mains on Third st., to Dennis & Christenson, McMinnville, at $13,220.

Altoona, Pa.—By Board of Water Commissioners, for trenching, to Saupp & Herr, at $4 per cu. yd. in asphalt streets, $4.20 per cu. yd. in brick paved streets, and 78 cents per cu. yd. in unpaved streets; for hauling pipe, to Wilkinson & Co.; for manhole valve boxes, to J. W. Bain; for corporation and curb cocks, to Hayes Manufacturing Co.; for furnishing all pipes from six-in. to 30-in., to United States Pipe & Foundry Co., and for gate valves, to Rensselaer Valve Co.

BIDS RECEIVED

Seattle, Wash.—For water mains on N. 66th st., as follows: Krogh & Jessen, $3,465.10; Erickson Bros., $3,608.90; Ferguson-Coit Co., $3,400.51; Hayden & Sons, $3,294.52; Will Kopta, $3,504; N. W. Construction Co., $3,348.17; Graff Construction Co., $3.468.12; D. H. Traphagen, $3,500.18; Dicken & Rightmire, $3,407.94;

Sullivan & Trew, $3,668.66; J. L. Ritchie, $3,580.87.

Seattle, Wash.—For laying water mains on North 41st st., as follows: C. J. Johnson & Co., $81,841.80; Jahn Contracting Co., $76,028.20; Ward & Scherer, $84,463.70; Ferguson-Coit Co., $79,618.10; G. C. Dietrich & Co., $76,761.10; Haydon & Sons, $80,717.20; Sparger Concrete Co., $81,878.20; Sound Construction & Engineering Co., $88,824.60; Krogh & Jessen, $85,085.20; J. L. Ritchie, $74,298.42; N. W. Construction Co., $96,377.25; Cummings & Kiehl, $86,999.50; Graff Construction Co., $79,767.80.

LIGHTING AND POWER

Alameda, Cal.—City Council has passed resolution calling bond election for $200,000 for improvements in Electricity, Fire and Police Departments.

Wilmington, Del.—City is considering erection of municipal lighting plant.

Covington, Ky.—Committee has been appointed to investigate plan for erection and operation of municipal light plant.

Dayton, Ky.—City Council has passed natural gas franchise ordinance.

Ville Platte, La.—City Council has granted franchise to Hon. L. J. Dossman for installation of up-to-date system of electric lights.

South Farmingham, Mass.—Taxpayers will vote on advisability of establishing electric lighting plant.

Duluth, Minn.—Voters are in favor of bond issue for construction of electric light plant.

Ellisville, Miss.—It is said that City Council will purchase electric light plant of Laurel Street Railway & Electric Co.

Tylertown, Miss.—Mayor and Board of Aldermen have granted to J. C. Flippen and C. H. Stevens franchise to construct, operate and maintain electric light system.

St. Louis, Mo.—Plans for "White Way" on Franklin ave., from 12th st. to Leffingwell ave., are being discussed.

Cape May, N. J.—Cap May Council is preparing to extend system of arches for lighting purposes which were placed on large portion of Boardwalk last year.

Chatham, N. Y.—Proposition to purchase electric light plant at sum not to exceed $25,000 will probably be submitted to people at coming election.

Niagara Falls, N. Y.—Bill of Senator R. H. Gittins, of this city, appropriating $50,000 for installation of plant to illuminate falls of Niagara, with $2,500 a year for maintenance, has passed Senate. It has not yet gone through Assembly.

Seneca Falls, N. Y.—Extension of street lighting system in Fall st. is being considered.

Williamsville, N. Y.—Voters have indorsed proposition to raise $1,000 for installation of lighting system.

Youngstown, O.—Improved lighting of business section is being discussed.

Youngstown, O.—Question of erection of municipal lighting plant is being discussed.

Sharon, Pa.—Ordinance has been passed providing for election on April 13 for voting on bond issue for municipal electric light plant.

Chattanooga, Tenn.—Mayor and Council of city of Rossville have granted franchise over its streets for poles and wires of Chattanooga Railway & Light Co., and within short time it is expected that Rossville will be lighted with electricity. Power from Ocoee plant will be run in and used not only to light residences, but to operate factories and corner lights on streets.

Dallas, Tex.—Plans and specifications are ready for installation of ornamental lighting system on Main and Commerce sts. These have been made by City Electrician Leon M. Taylor.

Dallas, Tex.—Installation of street lights have been ordered at various intersections of streets.

Tacoma, Wash.—Ordinance has been passed appropriating $50,000 from light fund and transferring same to city of Aacoma electric light and power fund for completion of Nisqually power plant.

Milwaukee, Wis.—Bids for installation of lights on Grand ave. viaduct have been rejected, and new bids will be advertised for. Highest bid was $95,000.

Superior, Wis.—Question of installation of municipal electric and gas system will probably be voted on at spring election.

Niagara Falls, Ont.—Ratepayers of St. Catharines will, on April 3, vote upon proposal to buy plant of St. Catharines Gas Co. for $38,000, according to decision of City Council.

CONTRACTS AWARDED

Gunnison, Col.—For construction of hydro-electric power plant, to Central Construction Co., Colorado Springs, at $67,500.

Wilmington, Del.—By Street and Sewer Department, to Wilmington & Philadelphia Traction Co., for lighting of Market st., between Front and 11th sts. Contract dates from Oct. 1, 1911, and extends for five years.

Cresco, Iowa—For installing ornamental street lighting system, to C. F. Freehauf.

Montclair, N. J.—By Council, to Public Service, 20-year contract for supplying town with heat, light and power.

New Providence, N. J.—For constructing new power plant at Tuberculosis Sanitarium, to Michael Brynes Building Co., 430 Westfield ave., Elizabeth, at $23,685.

Pawhuska, Okla.—For constructing repairs and extensions to electric light system, to Osage Electrical Co., of Pawhuska, at $2,264.

Salt Lake City, Utah—For work at county powerhouse and for jail in Garfield, by County Commissioners, as follows: Jail contract, to Mortensen & King on bid of $3,297; powerhouse electrical work, to Intermountain Electric Co., $386; ventilating, to Wahiquist & Labhardt, $1,658; plumbing, to Midgley Bros., $550.

FIRE EQUIPMENT

Montgomery, Ala.—City will spend $2,500 in purchasing new fire hose.

Alameda, Cal.—City Council has passed resolution calling bond election for $200,000 for improvements to Fire and Police Departments and in electricity.

Grass Valley, Cal.—Purchase of new fire apparatus has been authorized.

Boulder, Col.—Bids have been rejected by Council for auto fire truck.

New London, Conn.—Purchase of combination chemical engine, hose wagon and steamer is being considered.

Athens, Ga.—Auto apparatus will probably be purchased.

Pekin, Ill.—Purchase of auto combination chemical engine and hose wagon is being considered.

Ellwood City, Ind.—Bonds in sum of $15,000 have been issued for Fire Department improvements.

Terre Haute, Ind.—Appropriation of $5,000 has been recommended to Council by City Comptroller L. G. Hughes, for purchase of combination chemical engine and hose wagon, motor-propelled.

Sac City, Ia.—Purchase of new chemical engine is contemplated.

Mermenton, La.—Council is considering purchase of chemical fire engine and other apparatus.

Biddeford, Me.—Purchase of auto combination pumping engine and hose wagon is contemplated.

Govans, Md.—Town is considering purchase of auto fire truck.

Attleboro, Mass.—Purchase of new automobile fire truck for South Attleboro district, to cost $5,500, has been voted for.

Clinton, Mass.—Appropriation of $13,000 has been made for Fire Department improvements.

Hancock, Mich.—Election will be held in April for voting on $100,000 bond issue for erection of West Hancock fire hall.

Little Falls, Minn.—Purchase of additional hose is being considered.

Dover, N. J.—Common Council has decided to erect two portable hose houses and place hose cart in each.

Garwood, N. J.—Estimate for installation of Gamewell fire alarm system in Garwood has been submitted to Borough Council by Fire Committee with recommendation that such system be installed. Estimate was for six alarm boxes and gong to be installed for sum of $1,025.

Hoboken, N. J.—It has been decided by Hoboken Fire Board to appropriate funds for purchase of automobile for Chief Engineer Michael Dunn and his assistant. Board will advertise for bids on 40 horsepower machine capable of carrying four passengers.

Montclair, N. J.—Combination chemical engine and hose wagon and hook and ladder truck will be purchased.

Passaic, N. J.—Appropriation of $3,600 has been made for purchase of fire hose; $4,600 for automobile chemical wagon for Alert Truck Co., and automobile for Assistant Chief Engineer. Thos. R. Watson, City Clerk.

Pitman, N. J.—Purchase of additional fire equipment is being considered.

Rahway, N. J.—Clerk has been authorized to advertise for bids for procuring of 1,500 ft. of new hose for Fire Department, bids to be opened at next meeting.

Brooklyn, N. Y.—Seven new fire engine houses, which will cost close upon $300,000, are about to be built in this borough. Plans have been drafted and approved by Fire Commissioner Johnson and Deputy Commissioner Farley.

Schenectady, N. Y.—Specifications for new tractor to be used in Fire Department on Truck No. 1 have been prepared by Fire Chief Yates, approved by Commissioner of Safety Cole and have been submitted to Board of Contract and Supply. Board will probably advertise for bids within short time.

Cleveland, O.—Bids will be received until 12 noon, March 25, at office of City Auditor, for purchase of $45,000 Fire Department coupon bonds. Thomas Coughlin, City Auditor.

Massillon, O.—Council has decided to purchase one automobile fire engine instead of two, as authorized by previous Council.

La Grande, Ore.—Bids will be advertised for by City Council for auto fire truck.

Allentown, Pa.—Council has been petitioned by Liberty Fire Co. for purchase of auto fire truck.

Altoona, Pa.—Installation of auto apparatus for Fire Department is being discussed.

Carlisle, Pa.—Council is considering purchase of auto fire engine; estimated cost, $6,000.

Chester, Pa.—Lansdowne Fire Co. is considering having combination chemical and hose truck, which is drawn by horses, changed to automobile fire truck.

Corry, Pa.—City will purchase combination chemical and hose wagon.

Newcastle, Pa.—City will probably appropriate $15,000 for purchase of auto fire apparatus.

Woonsocket, R. I.—Appropriation of $14,000 has been made for erection of new fire station in Social district.

Barre, Vt.—Motor combination chemical and hose truck will probably be purchased.

CONTRACTS AWARDED

Pasadena, Cal.—To Crowell & Seward, for construction of two-story brick addition to Mentor ave. fire engine house, for sum of $3,779, with deduction of $150 for cement instead of asphalt floor, and additional sum of $175 for construction of walls in accordance with new building code.

Peoria, Ill.—To Manhattan Rubber Manufacturing Co., Passaic, N. J., for supplying city with 5,000 ft. of fire hose.

BRIDGES

Pasadena, Cal.—Contract will shortly be awarded for $200,000 concrete bridge across Arroyo Seco at foot of Colorado st.

Boston, Mass.—Construction of bridge, between Acushnet & New Bedford, is recommended by City Engineer Williams; estimated cost, $25,000.

Haverhill, Mass.—Construction of two bridges across Little River, one at about Eighth ave. and another farther up stream is recommended; estimated cost, $10,000.

Lawrence, Mass.—Appropriation of $5,000 has been made for repairs on Broadway bridge, crossing the Spicket River.

Saginaw, Mich.—Erection of bridge over Saginaw River at Johnson st. is being considered.

Cloquet, Minn.—City Council has accepted specifications of Great Northern Bridge Co., of Minneapolis, for new bridge across south branch of St. Louis River, to join city of Cloquet and Dunlap Island.

Minneapolis, Minn.—Bids will be received until 2 p.m., March 28, by Committee of Ways & Means of City Council, for purchase of $200,000 bridge bonds. Dan C. Brown, City Comptroller.

Elizabeth, N. J.—Bridge has been ordered over Rahway River connecting Lawrence st. and Woodbridge ave., in Rahway. Cost will not exceed $18,000, and bridge will be on swing style.

Albany, N. Y.—Senate has passed Senator White's bill appropriating $50,000 for highway bridge over movable dam No. 5 at Rotterdam on Mohawk.

Kingston, N. Y.—Erection of bridge across Rondout Creek, between Kingston and Sleightsburgh, is being considered.

Dayton, O.—Bids will be received until 12 noon, April 9, at office of City Auditor, for purchase of $65,000 worth of bonds for construction of bridge at Keowee st. Geo. W. Bish, City Auditor.

Toledo, O.—Providence Savings Bank & Trust Co., of Cincinnati, has been awarded issues of $135,000 bridge bonds, and $170,000 street improvement bonds by Finance Committee.

Youngstown, O.—County Commissioners have instructed the County Surveyor to advertise for bids for a bridge with a 42-ft. span across Parsons' Run at West Lowellville.

Youngstown, O.—Bids will be received until 2 p.m., March 25, at office of City Auditor, for purchase of $1,000 bridge repair bonds.

Allentown, Pa.—Highway and Railroad Committee of City Council have approved proposition of Lehigh Valley Transit Co., to build $500,000 bridge, 200 ft. long, to connect Allentown with South Allentown.

Woonsocket, R. I.—Appropriation of $36,000 has been made for building of bridge on Bernon st.

Floresville, Tex.—Commissioners have awarded contracts for erection of four new iron bridges; estimated cost, $17,444.

San Angelo, Tex..— Commissioners' Court has been petitioned by 300 property taxpaying voters to issue $70,000 in bonds to build four viaducts across Concho River and one causeway.

CONTRACT AWARDED

Danville, Ill.—For constructing 150-ft. steel bridge at Cheney Ford, by Bridge Committee, to Paris Bridge Co., Paris, Ill., at $5,900.

Martinsville, Ind.—For constructing and repairing six bridges, by Commissioners of Morgan County, to Paris Bridge Co., Paris, Ill., at $5,120.

Salem, Ind.—Frank S. Munkelt, County Auditor, writes that the contract for constructing a concrete bridge over White River (bids opened March 4) has been awarded to the National Concrete Co., Indianapolis, for $6,229.

Ottumwa, Ia.—To Ottumwa Supply & Construction Co., of Ottumwa, for reconstructing floor system of Market st. bridge at $22,780. Other bidders were: A. W. Van Hofflen & Co., Minneapolis, Minn., $23,086; Ottumwa Bridge Co., Ottumwa, $23,650; Cook Construction Co., Des Moines, $24,864; Midland Bridge Co., Kansas City, Mo., $27,344.

Ottumwa, Iowa.—By City Council, for reconstructing floor system of Market st. bridge, to Ottumwa Supply & Construction Co., at $22,780. Other bids were: A. W. Van Hofften & Co., Minneapolis, Minn., $23,086; Ottumwa Bridge Co., $23,650; Cook Construction Co., Des Moines, Ia., $24,864; Midland Bridge Co., Kansas City, Mo., $27,344. John T. Brady is City Engineer.

Shelbyville, Ky.—For construction of street bridge over Bush Creek on Duncan and Lebanon pike, to Champion Bridge Co., at $2,000.

Garrison, Mont.—For constructing steel bridge across Deer Lodge Creek, to O. E. Peppard, of Missoula, for $6,600.

Carthage, Mo.—By County Court, as follows: Purcell bridge, superstructure, to A. M. Blodgett Construction Co., for $6,091; substructure to W. W. Williams, of Joplin, for $2,506. Bridge over Jenkins Creek, superstructure, to A. M. Blodgett Construction Co., for $1,745; substructure, to the Missouri Valley Bridge Co., for $2,544. Concrete arch over Turkey Creek, to Missouri Valley Bridge Co., for $6,390. Total of all these contracts is $19,276.

New Brunswick, N. J.—By Board of Freeholders, for construction of Scherger swing bridge over Cheesequage Creek at Morgan Station, to Oswego Bridge Co., Oswego, N. Y., at $43,250.

Vineland, N. J.—By joint committee of Boards of Freeholders of Cumberland and Salem Counties, to Owego Bridge Co., for construction of joint county bridge at Almond rd., at $1,500. Other bids as follows: Ogden R. Pratt, $1,789; Edward Steelman, $2,616; H. A. Hankins & Bro., $2,739; Richmond & Craig, $2,819.63.

Salisbury, N. C.—For constructing bridge across South River, between Rowan and Davie Counties, to Virginia Bridge & Iron Co., Roanoke, Va., at $5,955.

Pembina, N. Dak.—For constructing county bridges during year 1912, by Commissioners of Pembina County, to Fargo Bridge & Iron Co., Fargo, N. Dak.

Chillicothe, O.—By Board of Commissioners of Ross County, to I. M. Junk, at about $1,240, for remodeling bridge at Laddyville.

Columbus, O.—By Board of Public Service, for furnishing material and constructing masonry approaches of viaduct over tracks of Hocking Valley Railway on S. High st., to Fritz-Rumer-Cook-Grant Co., of Columbus, at $85,475. Other bidders: W. M. Brode & Co., Newcomerstown, O., $88,931; Pittsburgh Construction Co., Pittsburgh, Pa., $93,359; D. W. McGrath, Columbus, O., $93,876; Gephart & Kline, Dayton, O., $94,780; Vang Construction Co., Cumberland, Md., $98,171; J. A. Swingle, Zanesville, O., $99,325; E. A. Patterson, Columbus, O., $100,607; D. E. Sullivan & Sons, Columbus, O., $101,408; the Kaps Brehm Co., Cincinnati, O., $102,013; L. E. Sturn, Columbus, O., $104,065; Clifton Bros., Zanesville, O., $106,789; E. G. Nave Bros., Portsmouth, O., $116,880. R. H. Simpson, of the Board of Public Service, is engineer in charge of work. Detailed bid on above work is as follows (a) Fritz-Rumer-Cook-Grant Co., Columbus, (b) Engineers estimate: 18,500 cu. yds. excavation (a) 35 cts., (b) 60 cts.; 20,200 cu. yds. embankment (a) 25 cts., (b) 30 cts.; 1,540 lin. ft. concrete Class A (parapet wall), (a) $2, (b) $2; 3,500 cu. yds. concrete Class B (footings), (a) $4.50, (b) $5; 1,540 lin. ft. masonry Class A (coping), (a) $1, (b) $1; 7,500 cu. yds. masonry Class B (concrete with sandstone facing), (a) $6.65, (b) $7.50; 190 lin. ft. limestone wheel course (a) $1.50, (b) $1; 30,000 lbs. twisted steel rods (a) 25 cts., (b) 3 cts.; 5,850 sq. ft. expanded metal (a) 20 cts., (b) 4 cts.; 1,000 cu. yds. crushed stone for roadway surface (a) $1.50, (b) $1.25; totals (a) $85,475, (b) $98,054.

Medina, O.—By Board of Commissioners of Medina County, for construction of bridges, as follows: Rocky River bridge, Oregonia Bridge Co., Lebanon, O., $2,091; Center st. bridge, Brookville Bridge Co., Brookville, O., $1,218.

Portland, Ore.—For constructing 500-ft. reinforced concrete viaduct on East 21st st., to International Contract Co., Central Bldg., Seattle, Wash., at $65,296.

Altoona, Pa.—By Board of Public Works, for construction of extension of piers of new Seventh st. bridge, to Murphy & Appleby, of this city, at $2,865.25. There were two other bids, that of J. S. Vipond Contracting Co., $3,531.50, and C. D. Hughes, $3,395.50.

Pawlings, Pa.—For 330-ft. steel girder bridge over Schuylkill River, to G. W. Ensign, Harrisburg, at $24,497.50.

Aberdeen, S. Dak.—By Commissioners of Brown County, for constructing four and repairing six bridges, to Gilbert Improved Corrugated Culvert Co., at $12,971.

Deadwood, S. Dak.—For constructing bridges during year 1912, to Standard Bridge Co., Omaha, Neb., by Commissioners of Lawrence County.

Sioux Falls, S. Dak.—For constructing bridges during year 1912, by Commissioners of Minnehaha County, as follows: Steel bridges, to Standard Bridge Co., Omaha, Neb.; reinforced concrete bridges, to Watertown Cement Product Co., Watertown, S. Dak.

Chattanooga, Tenn.—For new flooring on Walnut st. bridge, by members of Hamilton County Road Commission, to M. K. Wilson; cost about $4,500.

MISCELLANEOUS

Hartford, Conn.—Election will be held April 2 for voting on additional $1,100,000 towards municipal building.

Hartford, Conn.—Board of Finance has approved of proposed appropriation of $25,000 for police signal system.

Atlanta, Ga.—Resolution will be introduced providing for $3,000 appropriation for erection of public comfort station.

Sanford, Me.—Town is considering erection of garbage destroying plant.

Baltimore, Md.—New recreation pier is planned on waterfront near foot of Broadway and Ann st.; estimated cost, $750,000.

Minneapolis, Minn.—Bids will be received until 2 p.m., March 28, by Committee on Ways and Means of City Council for purchase of $100,000 park bonds, and $200,000 permanent improvement bonds. Dan C. Brown, City Comptroller.

Passaic, N. J.—Appropriation of $2,000 has been made for purchase of combination automobile police patrol and ambulance. Thos. R. Watson, City Clerk.

Buffalo, N. Y.—Sum of $25,000 may be expended by city for improvement of Broadway market.

Rochester, N. Y.—Purchase of 90 new voting machines is being considered.

Dayton, O.—Plans for contemplated station house will be prepared and construction will shortly be commenced.

Miamisburg, O.— Motion has been adopted for erection of city hall to cost about $25,000.

Erie, Pa.—Special garbage committee of Councils, with Mayor Sterr. Health Officer Wright and City Engineer Briggs met at City Hall to hear statements from representatives of disposal companies at Buffalo and St. Louis. After deliberation it was decided to have both companies submit plans and specifications of plant they think city should install and present them to committee.

Erie, Pa.—Chief of Police Detzel has asked Select Council for auto patrol wagon.

Pittsburgh, Pa.—Pittsburgh's Council of Nine, sitting as Health and Sanitation Committee, affirmatively recommended ordinance to let contract for disposing of city's refuse.

Scranton, Pa.—Plans are being considered for $100,000 bond issue for city improvements.

Chattanooga, Tenn.—Election will be held on March 26 for voting on $250,000 bond issue for public park purposes.

Dallas, Tex.—City Commission on recommendation of Mayor Holland, has authorized purchase of two-passenger automobile for City Health Officer.

Dallas, Tex.—Bond issue of $475,000 will be asked for building and equipping of new City Hall.

Dallas, Tex.—Election will be held in April to vote on issuing bonds of $1,300,000 for various municipal improvements.

CONTRACTS AWARDED

Pasadena, Cal.—To A. F. Charles, the garbage contract, by City Council. His bid was at 56 cts. an hour for average of eight hours per day.

Indianapolis, Ind.—By Board of County Commissioners, for 40,000 gals. of oil for Marion County, to Barrett Mfg. Co., at 10½ cts. per gal.

Boston, Mass.—For building first section of Boylston st. subway, between Kenmore st. and Massachusetts ave, by Boston Transit Commission, to Hugh Nawn Construction Co., whose bid was $532,000.

Rochester, N. Y.—By Board of Contract & Supply, for new automobile for City Engineer, to A. M. Zimbrich, at $1,650.

Dayton, O.—For construction of new roof on boiler room at pumping station, to Central States Bridge Co., by Board of Control, at $1,816. This also includes the furnishing of the material.

Lakewood, Ohio—To Hugh O'Neill, by Director of Public Service, for collecting garbage and dead animals in city for period of two years, commencing March 1, at $274 per month.

Erie, Pa.—By Water Commissioners, for erection of central supply building at 12th and Myrtle sts., to Constable Bros. Co. Following are bids received: Constable Bros. Co., building complete, $12,763; without plumbing, $12,154; plumbing and heating, $460; electrical wiring, $150. J. P. Simon, building complete, $18,387.62; without plumbing, $17,722.27; plumbing and heating, $475; electrical wiring, $190.35. Kirschner Bros., building complete, $13,030; without plumbing, $12,250; plumbing and heating, $490; electrical wiring, $195. Wm. Ackerman, building complete, $13,430; without plumbing, $12,830; plumbing and heating, $400; electrical wiring, $200. Henry Shenk Co., building complete, $12,882; without plumbing, $12,271; plumbing and heating, $462; electrical wiring, $150.

Philadelphia, Pa.—By Director Cooke, for Mack motor truck repair wagon of 40 horsepower, two-ton capacity, to International Motor Co., at $3,262.

Chattanooga, Tenn.—For erection of Hamilton County's new jail, to Van Dorn Iron Works Co., of Cleveland, O., at $89,000.

Fond du Lac, Wis.—To Immel Construction Co., of Fond du Lac, for erection of almshouse and central heating plant at West Bend, at cost of $47,991.

BIDS RECEIVED

Swampscott, Mass.—For furnishing oil for streets, as follows: American Car Sprinkler Co., 30 per cent. to 40 per cent. asphalt oil, 1 1-15 cts. per sq. yd., Swampscott to clean the streets. Standard Oil Co., 30 per cent. to 40 per cent. oil in 6,000 gal. lots, 4.4 cts. per gal. or will apply for 1.2 cts. per sq. yd. Trinidad Co., Trinidad liquid asphalt grade at 6.2 cts. per gal. in 4,000, 8,000 and 10,000 gal. lots. Indian Refining Co., special road oil, 5 cts. per gal.; liquid asphalt, 6 cts. per gal.; asphalt binder, 6½ cts. per gal. Alden Spear Sons Co., tassoil, 5⅝ cts. per gal.; 35 per cent. asphalt, 4⅞ cts. per gal.; 40 per cent., 6¼ cts. per gal.; 60 per cent., 6¾ cts. per gal.; heavy tassoil, 5¾ cts. per gal. Dustolene Co., dustolene, 6.95 cts per gal.; Sampson road oil, 5.95 cts. per gal. Michael McDonough, one-half gal. to the yard, 90 per cent. asphalt, 6½ cts. per gal.; 60 per cent., 5 cts. per gal.; 40 per cent., 4½ cts. per gal.; light road oil, 6.05 cts. per gal.; 90 per cent. asphalt on the streets, 12 cts. per yd.; 60 per cent., 10 cts. per yd. on the streets; 40 per cent. dust layer on the streets, streets swept and applied, 2 cts. per yd.; light dust oil applied, 1 ct. per yd.

TOO LATE FOR CLASSIFICATION

BIDS ASKED FOR

State	City	Received Until	Nature of Work.	Address Inquiries to
		STREET IMPROVEMENTS		
Massachusetts.	Haverhill.....	Mar. 25, 11 a.m....	Furn. edge stones, flagging, pavg. blocks & castings for 1912.	R. L. Wood, Head Dep. Sts. & H'wys.
Indiana.....	Martinsville.....	Apr. 1, 2 p.m.....	Constrn. gravel roads.....	J. S. Whittaker, Aud.
Indiana.....	Sullivan.....	Apr. 2, noon.....	Constrn. stone and gravel roads.....	Ben C. Crowder, Aud.
Indiana.....	Valparaiso.....	Apr. 2, 10 a.m.....	Constrn. gravel road.....	C. A. Blachley, Aud.
Ohio.....	Rocky River.....	Apr. 4.....	Constrn. cement walks.....	Frank Mitchell, Clk.
Indiana.....	Muncie.....	Apr. 8, 10 a.m.....	Improving highway.....	Francis M. Williams, Aud.
W. Virginia...	Huntington.....	Apr. 15, 1.30 p.m...	Pavg. number of streets and alleys with vit. paving brick...	John Coon, Comr. Sts. & Parks.
Ohio.....	Cleveland.....	Apr. 24, 11 a.m.....	Improving Green road.....	John F. Goldenbogen, Clk.
		SEWARAGE		
Wisconsin....	Marinette.....	Apr. 3, 2 p.m.....	Constrn. 36-in. (2 ring) brick sewer.....	A. L. Hillis, City Engr.
Ohio.....	Lakewood.....	Apr. 15, noon.....	Constrn. several sewers.....	J. W. Chrisford, Dir. Pub. Serv.
W. Virginia..	Kingwood.....	Apr. 15 (about)....	Constrn. sewer system; cost, $10,000.....	V. B. Dunn, Mayor; J. K. Monroe, Engr.
		LIGHTING AND POWER		
Maryland.....	Baltimore.....	Mar. 27, 11 a.m., re-advertisement.....	Alterations to Mt. Royal pumping station.....	E. B. Whitman, Water Engr.
Pennsylvania..	Schickshinny....	Apr. 1.....	Constrn. gravity water works system.....	M. B. Hughes, Sec'y.
		BRIDGES		
Ohio.....	Cleveland.....	Mar. 30.....	Constrn. bridge.....	J. F. Goldenbogen, County Clk.
Ohio.....	Cincinnati.....	Apr. 5, noon.....	Constrn. culverts, Green township.....	Albert Reinhardt, Clk. Co. Commrs.
		MISCELLANEOUS		
Massachusetts.	New Bedford....	Mar. 27, 5 p.m.....	Setting boiler and building stack at city yard.....	C. F. Lawton, Supt. of Sts.
Indiana.....	Ft. Wayne.....	Apr. 4, 7.30 p.m....	Constrn. city's portion of track elevation.....	F. T. Benoy, Bd. Pub. Wks.

STREET IMPROVEMENTS

St. Augustine, Fla.—City Council has authorized grading of Cincinnati and Rhode aves.

St. Augustine, Fla.—Ordinance has been passed providing for grading, paving and curbing of Saragossa st. J. M. G. Carrera, City Clerk.

Augusta, Ga.—Streets and Drains Committee of City Council has directed Commissioner of Public Works Wingfield to get specifications and advertise for bids for permanent paving on 12th st. and Walton way. Bids will be advertised for at once.

Indianapolis, Ind.—Board of Park Commissioners has decided to complete in 1912, boulevard between Spades and Brookside Parks, along north bank of Pogues Run. Boulevard between Spades Park and Tacoma ave. has already been graded, and is ready for paving, and new work contemplated is between Tacoma ave. and 19th st., latter being north boundary line of Brookside Park.

St. Martinville, La.—Police Jury has appropriated $1,000 to be used changing road from New Iberia to lower end of this parish line, which leads to Wyches tollgate, in Iberia Parish.

South Hadley, Mass.—Expenditure of $10,000 for purpose of paving Bridge st., from Main to Lamb sts., is being considered.

Clyde, N. Y.—Taxpayers will vote on proposition to bond village in sum of $10,000 for purpose of improving parts of Glasgow and South Park sts. with brick, and West Genesee st. with macadam.

Malone, N. Y.—At special meeting of Franklin County Board of Supervisors two plans for road improvement were adopted. North-South Bangor rd. calls for expenditure of $28,000. The Tupper Lake-Moody rd. calls for total of $82,000.

Watkins, N. Y.—At special session of Board of Supervisors resolutions were adopted to build following roads at total cost of $128,800. Road No. 1, beginning at corporation limits of Montour Falls and extending east through the villages of Odessa and Alpine to town line of Cayuta, a distance of 6.68 miles. Estimated cost of this road is $73,100, State defraying 70 per cent., or $49,955.20, county 20 per cent., or $14,220; town of Montour, 3 per cent., or $2,650.28; town of Catherine, 7 per cent., or $4,274.52, and village of Odessa, $2,000 extra work. Other highway begins at Orange town line and extends north through villages of Tyrone, Altay to Reading town line. Cost of this road is $55,700, of which State is to pay 73 per cent., or $40,661; county, 20 per cent., or $11,140, and town of Tyrone, 7 per cent., or $3,899. Funds to build these highways will probably be raised by issuance of bonds.

Sanford, N. C.—Bonds to amount of $100,000 have been issued and will be sold by Highway Commission.

Toledo, O.—Bids will be received until 2.30 p.m., March 22, at office of Howard Mouser, Auditor of Paulding County, for purchase of $62,500 worth of pike bonds.

Harrisburg, Pa.—Bids will be advertised at once for rebuilding of river road.

Hazleton, Pa.—New ordinances have been introduced for grading and curbing of various streets.

Pittsburgh, Pa.—County Commissioners have selected list of county roads, totaling about 30 miles, to be improved this year at cost of over $400,000. Commissioners have passed resolution submitting list to Grand Jury, which will be asked to authorize expenditure.

Steelton, Pa.—Petition will be circulated for paving of Pine st.

Wilkinsburg, Pa.—Council has adopted resolution directing Borough Clerk to advertise sale of $50,000 in bonds for street improvements.

Greenville, S. C.—Agitation has begun in Greenville for another $150,000 bond issue for street paving, resolution to this effect having been prepared for introduction at next week's Council meeting. Bond issue for amount named will practically complete paving of every prominent thoroughfare in city.

Chatham, Va.—Town Council has fixed April 18 as date for bond issue election, at which qualified voters will express their wishes as to expending of $30,000 in permanent improvements in town. Expenditure will be $20,000 for paving streets, and $10,000 for water meters and sewers.

Richmond, Va.—Considerable portion of Broad st. will be paved with asphalt at cost of $50,000.

CONTRACTS AWARDED

Westport, Conn.—To F. L. Merritt, of Stamford, for paving Riverside ave., for about $13,000.

Augusta, Ga.—By Streets and Drains Committee of City Council, to W. F. Bowe, to set curbing for Barret Plaza.

Michigan City, Ind.—By City, to Western Construction Co., of Lafayette, for paving Willard ave., Wabash st. and other streets, in all about 25,600 sq. yds., with Trinidad Lake asphalt.

Maumee, O.—For reflooring with creosoted wood block and painting Maumee Perrysburg bridge, to R. W. Johnson, for $6,282.

Toledo, O.—By City, for paving 10 streets, as follows: Michigan ave., Madison to Jefferson, sheet asphalt, Carpenter & Anderson, bid, $3,770.75; Collingwood, Central to Cherry, sheet asphalt, Carpenter & Anderson, $11,320.75; Central ave., Lagrange to Hartman, vitrified brick, Albert Grzybowski, $4,239.94; Nessle st., Parkwood to Michigan Central Railroad, asphalt block, Asphalt Paving Block Co., $15,983; First st., Oak to Utah, vitrified brick, P. Watters, $4,405.05; Grand ave., Monroe to Forest, sheet asphalt, Carpenter & Anderson, $7,649.25; Waite ave., Oakwood to Green, sheet asphalt, H. P. Streicher, $11,987.50; 11th st., Illinois to Avondale, vitrified brick, P. Watters, $2,776.70; Ewing st., Indiana to Vance, Metropolitan block, Henry Sheehand & Son, $6,894.14; Hoag st., Dorr to Nebraska, Metropolitan block, Henry Sheehand & Son, $17,506.84; Delaware ave., Auburn to Albion, vitrified block, Peters Bros., $14,227.95, and Utah st., First to Greenwood, vitrified brick, P. Watters, $4,174.41.

Richmond, Va.—By City, for repair work, such as resetting curbing, flagging, roadbed paving, etc., to I. J. Smith & Co., Inc., at about $25,000.

SEWERAGE

Orlando, Fla.—Question of bonding town for system of sewerage is being discussed.

Newark, N. J.—Board of Street & Water Commissioners will construct storm water sewer along line of East branch of Elizabeth River through Caroline ave., Laurel pl. and various other streets. M. R. Sherrerd, Chief Engineer.

Chester, Pa.—Ordinance has been passed providing for construction of sewer in Saville ave.

Hazleton, Pa.—Ordinance providing for construction of sewer on Broad st., from Linden to Lincoln, has been passed on third reading.

Chatham, Va.—Election will be held April 18 for voting of $30,000 bond issue for permanent improvements; $10,000 is for sewers and water meters.

Norfolk, Va.—People of Huntersville have filed with Ninth Ward Improvement Committee requests for amendment to pending improvement scheme for that ward to effect that $40,000, which it had been proposed to spend in paving Chapel st. and Washington ave., be applied to installation of sewer laterals.

Kingswood, W. Va.—City has voted bonds to extent of $10,000 for construction of sewer system.

CONTRACT AWARDED

Portland, Ind.—For construction of east sewer, to Griffith & Sprinkle, of Portland, at $7,469. J. W. Fitzmaurice, of Winchester, and N. N. North, of Bluffton, were also bidders.

WATER SUPPLY

Orlando, Fla.—Question of bonding town for municipal ownership of waterworks is being discussed.

Columbus, Ga.—City is advertising fact that bond election is to be held shortly for purpose of issuing $350,000 in bonds for purpose of establishing municipal waterworks plant on river north of Columbus.

Macon, Ga.—Bids will be received by the Board of Water Commissioners up to noon, Monday, April 8, for 50 city of Macon waterworks bonds, of par value of $1,000 each. W. H. Fetner, Chairman.

Coffeyville, Kan.—Mass meeting of citizens here asked Mayor to call special election to vote on $130,000 bond issue for construction of waterworks.

Elkton, Md.—Council will ask Legislature for authority to make $50,000 loan to build municipal waterworks.

Manchester, Mass.—Town will construct sewer system.

Yazoo City, Miss.—City Council has authorized issuance of $30,000 worth of bonds for purpose of installing water meters and for general improvement of water system.